

DB2 10 for z/OS

*Installation and Migration Guide*





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**Notes**

Before using this information and the product it supports, be sure to read the general information under “Notices” at the end of this information.

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This edition applies to DB2 10 for z/OS (product number 5605-DB2), DB2 10 for z/OS Value Unit Edition (product number 5697-P31), and to any subsequent releases until otherwise indicated in new editions. Make sure you are using the correct edition for the level of the product.

Specific changes are indicated by a vertical bar to the left of a change. A vertical bar to the left of a figure caption indicates that the figure has changed. Editorial changes that have no technical significance are not noted.

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## About this information

This information describes installation and migration of DB2<sup>®</sup> for z/OS<sup>®</sup> (DB2) in a data sharing and non-data-sharing environment.

Throughout this information, “DB2” means “DB2 10 for z/OS”. References to other DB2 products use complete names or specific abbreviations.

**Important:** To find the most up to date content, always use IBM<sup>®</sup> Knowledge Center, which is continually updated as soon as changes are ready. PDF manuals are updated only when new editions are published, on an infrequent basis.

### Availability of new function in DB2 10

Generally, new SQL capabilities, including changes to existing functions, statements, and limits, become available only in new-function mode, unless explicitly stated otherwise. Exceptions to this general statement include optimization and virtual storage enhancements, which are also available in conversion mode unless stated otherwise. In DB2 Version 8 and DB2 9, most utility functions were available in conversion mode. However, for DB2 10, most utility functions become available in new-function mode.

---

## Who should read this information

This information is primarily intended for those people who are responsible for installing DB2 or setting up DB2 for distributed communications. This information is intended for those people who plan to install DB2 from the enterprise server using the installation CLIST.

This information assumes that you are familiar with:

- The basic concepts and facilities of DB2 in the z/OS environment
- The z/OS Time Sharing Option (TSO) and the z/OS Interactive System Productivity Facility (ISPF)
- The basic concepts of Structured Query Language (SQL)
- The basic concepts of Customer Information Control System (CICS<sup>®</sup>)
- The basic concepts of Information Management System (IMS<sup>™</sup>)
- How to define and allocate z/OS data sets by using z/OS job control language (JCL)
- How to use IBM System Modification Program/Extended (SMP/E) to install IBM licensed programs

To set up DB2 for distributed communications, knowledge of Virtual Telecommunications Access Method (VTAM<sup>®</sup>) or Transmission Control Protocol/Internet Protocol (TCP/IP) is also needed.

---

## Migration information

This information is intended to provide guidance for migrating to DB2 10 from DB2 Version 8 or DB2 9. Most of the information applies to migration from either version.

Information that is specific to migration from only DB2 Version 8 is identified where it occurs by the following markings:

**From V8** Information about migrating from DB2 Version 8... **From V8**

Information that is specific to migration from only DB2 9 to DB2 10 is identified where it occurs by the following markings:

**From V9.1** Information about migrating from DB2 9 **From V9.1**

---

## DB2 Utilities Suite for z/OS

**Important:** In DB2 10, the DB2 Utilities Suite for z/OS is available as an optional product. You must separately order and purchase a license to such utilities, and discussion of those utility functions in this publication is not intended to otherwise imply that you have a license to them.

DB2 Utilities Suite for z/OS can work with DB2 Sort for z/OS and the DFSORT program. You are licensed to use DFSORT in support of the DB2 utilities even if you do not otherwise license DFSORT for general use. If your primary sort product is not DFSORT, consider the following informational APARs mandatory reading:

- II14047/II14213: USE OF DFSORT BY DB2 UTILITIES
- II13495: HOW DFSORT TAKES ADVANTAGE OF 64-BIT REAL ARCHITECTURE

These informational APARs are periodically updated.

**Related concepts:**

 DB2 utilities packaging (DB2 Utilities)

---

## Terminology and citations

When referring to a DB2 product other than DB2 for z/OS, this information uses the product's full name to avoid ambiguity.

The following terms are used as indicated:

**DB2** Represents either the DB2 licensed program or a particular DB2 subsystem.

**Tivoli® OMEGAMON® XE for DB2 Performance Expert on z/OS**

Refers to any of the following products:

- IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
- IBM Tivoli OMEGAMON XE for DB2 Performance Monitor for z/OS
- IBM DB2 Performance Expert for Multiplatforms and Workgroups
- IBM DB2 Buffer Pool Analyzer for z/OS

**C, C++, and C language**

Represent the C or C++ programming language.

**CICS** Represents CICS Transaction Server for z/OS.

**IMS** Represents the IMS Database Manager or IMS Transaction Manager.

**MVS™** Represents the MVS element of the z/OS operating system, which is equivalent to the Base Control Program (BCP) component of the z/OS operating system.

## RACF®

Represents the functions that are provided by the RACF component of the z/OS Security Server.

---

## Accessibility features for DB2 10 for z/OS

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

### Accessibility features

The following list includes the major accessibility features in z/OS products, including DB2 10 for z/OS. These features support:

- Keyboard-only operation.
- Interfaces that are commonly used by screen readers and screen magnifiers.
- Customization of display attributes such as color, contrast, and font size

**Tip:** The IBM Knowledge Center (which includes information for DB2 for z/OS) and its related publications are accessibility-enabled for the IBM Home Page Reader. You can operate all features using the keyboard instead of the mouse.

### Keyboard navigation

For information about navigating the DB2 for z/OS ISPF panels using TSO/E or ISPF, refer to the *z/OS TSO/E Primer*, the *z/OS TSO/E User's Guide*, and the *z/OS ISPF User's Guide*. These guides describe how to navigate each interface, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

### Related accessibility information

#### IBM and accessibility

See the *IBM Accessibility Center* at <http://www.ibm.com/able> for more information about the commitment that IBM has to accessibility.

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## How to send your comments

Your feedback helps IBM to provide quality information. Please send any comments that you have about this book or other DB2 for z/OS documentation.

Send your comments by email to [db2zinfo@us.ibm.com](mailto:db2zinfo@us.ibm.com) and include the name of the product, the version number of the product, and the number of the book. If you are commenting on specific text, please list the location of the text (for example, a chapter and section title or a help topic title).

---

## How to read syntax diagrams

Certain conventions apply to the syntax diagrams that are used in IBM documentation.

Apply the following rules when reading the syntax diagrams that are used in DB2 for z/OS documentation:

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

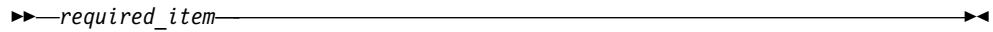
The  $\blacktriangleright$ — symbol indicates the beginning of a statement.

The — $\blacktriangleright$  symbol indicates that the statement syntax is continued on the next line.

The  $\blacktriangleright$ — symbol indicates that a statement is continued from the previous line.

The — $\blacktriangleleft$  symbol indicates the end of a statement.

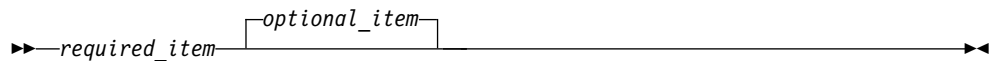
- Required items appear on the horizontal line (the main path).



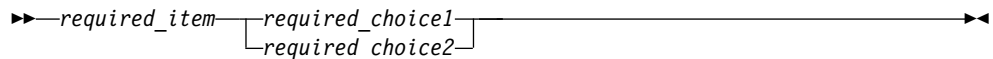
- Optional items appear below the main path.



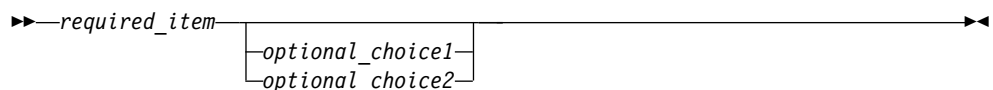
If an optional item appears above the main path, that item has no effect on the execution of the statement and is used only for readability.



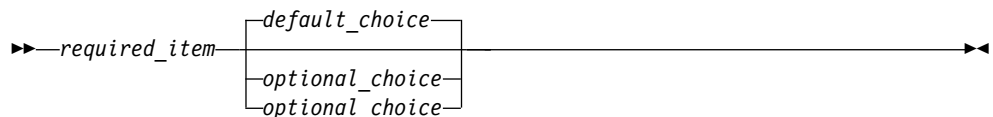
- If you can choose from two or more items, they appear vertically, in a stack. If you *must* choose one of the items, one item of the stack appears on the main path.



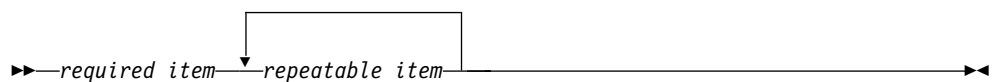
If choosing one of the items is optional, the entire stack appears below the main path.



If one of the items is the default, it appears above the main path and the remaining choices are shown below.



- An arrow returning to the left, above the main line, indicates an item that can be repeated.



If the repeat arrow contains a comma, you must separate repeated items with a comma.



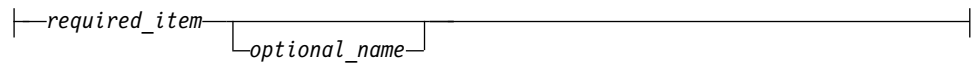


A repeat arrow above a stack indicates that you can repeat the items in the stack.

- Sometimes a diagram must be split into fragments. The syntax fragment is shown separately from the main syntax diagram, but the contents of the fragment should be read as if they are on the main path of the diagram.



**fragment-name:**



- With the exception of XPath keywords, keywords appear in uppercase (for example, FROM). Keywords must be spelled exactly as shown. XPath keywords are defined as lowercase names, and must be spelled exactly as shown. Variables appear in all lowercase letters (for example, *column-name*). They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or other such symbols are shown, you must enter them as part of the syntax.

**Related concepts:**

- [Syntax rules for DB2 commands \(DB2 Commands\)](#)
- [DB2 online utilities \(DB2 Utilities\)](#)
- [DB2 stand-alone utilities \(DB2 Utilities\)](#)

**Related information:**

- [DB2 and related commands \(DB2 Commands\)](#)



---

## Chapter 1. Installing and migrating DB2

The essential steps are similar for both installing DB2 10 and migrating to DB2 10 conversion mode (from Version 8 or Version 9). From conversion mode (from Version 8 or Version 9), you must complete additional steps to migrate to DB2 10 new-function mode.

### Before you begin

Prepare your system for DB2 installation or migration, as described in Chapter 2, “Preparing your system to install or migrate to DB2 10,” on page 5.

### About this task

#### Installation and migration tools

DB2 provides a set of tools that automate the process of installing or migrating. These tools include:

- Most of the job control language (JCL) that is needed to install and migrate DB2 10. This JCL constitutes the installation and migration jobs. Each of these jobs helps you perform an installation or migration task.
- The installation CLIST (command list) to help tailor the installation and migration jobs. This CLIST is also called the *migration CLIST*, or simply the *CLIST*. It contains the necessary code for tailoring the jobs to suit your needs.

**Tip:** You can capture most settings of an existing DB2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see Updating the CLIST defaults input member: job DSNTIJXZ and DSNTXAZP tool.

- A series of ISPF panels that you can use to pass information to the CLIST. With Interactive Systems Productivity Facility (ISPF) and Interactive Systems Productivity Facility/Program Development Facility (ISPF/PDF), you can use a series of ISPF panels to pass parameter values to the CLIST. The CLIST uses these values to tailor the installation and migration jobs. This process is called the ISPF *tailoring session*.
- Sample applications to help determine if you installed or migrated DB2 correctly. DB2 provides a set of sample programs and procedures that help you determine if DB2 is operating correctly.

All references to SYS1.PARMLIB also imply the logical PARMLIB data set that is used for DB2.

#### Minimal assemblies

Because it is distributed as object code, DB2 requires few assemblies. You must complete an assembly to specify DB2 initialization parameters, but this assembly requires only a few seconds.

#### Ability to defer decisions about DB2 characteristics:

DB2 allows you to specify many subsystem characteristics during DB2 operation. You can modify initialization parameters, authorize users, define

databases and tables, and tune DB2 while DB2 is running. Therefore, you can defer many decisions until after you finish installing or migrating DB2.

### **Ability to update installation and migration options**

During the process of installing and migrating, DB2 uses ISPF panels to prompt you for many options. DB2 allows you to update most of these options without requiring you to reinstall or remigrate. You can accept the default values for certain options and, after acquiring experience with DB2, tailor them to suit your needs.

## **Procedure**

To install or migrate to DB2 10, you complete the following procedures:

1. Estimate storage needs.
2. Determine which new functions you need.
3. If you are using distributed data, install VTAM and, optionally, TCP/IP.
4. Set up a Parallel Sysplex<sup>®</sup> if you plan to use data sharing.
5. Load the DB2 libraries (do the SMP/E steps). If you plan to use the callable SQL interface of DB2, see *Configuring DB2 ODBC and running sample applications (DB2 Programming for ODBC)* for the additional installation jobs that you need to run. If you plan to use DB2 for z/OS Java™ Edition, see *Installing the IBM Data Server Driver for JDBC and SQLJ* for additional installation jobs that you need to run.
6. If you are migrating, install needed service on the prior release. See the DB2 Program Directory for information about needed service.

**Important:** Apply the fallback SPE and stop and restart DB2 9 for every subsystem or data sharing member that you plan to migrate to DB2 10. For data sharing, every member must be started in DB2 9 after the fallback SPE is applied. After migration to DB2 10 new-function mode, any active members that did not start in DB2 9 with the fallback SPE applied prevent DB2 10 from starting. Inactive members that never started with the fallback SPE applied in DB2 9 cannot start in DB2 10 or DB2 9 after migration to DB2 10 completes on any other member.

7. If you are migrating, check release incompatibilities, and make the necessary changes in your applications.
8. If you are installing, provide an SMS environment for managing DB2 catalog and directory data sets. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.
9. Tailor the installation or migration jobs.
10. Install DB2 10 or migrate to DB2 10 conversion mode (from Version 8 or Version 9).
11. Connect the DB2 attachment facilities.
12. Prepare DB2 for use.
13. Verify the DB2 10 installation or migration to DB2 10 .
14. Verify the DB2 10 installation or migration to conversion mode (from Version 8 or Version 9).
15. If you encounter problems during or after migration to DB2 10 conversion mode (from Version 8 or Version 9), you can complete the following procedures:

- a. Fall back to your previous version (Version 8 or DB2 9).
  - b. Remigrate to DB2 10 conversion mode (from Version 8 or Version 9).
16. After you migrate to conversion mode (from Version 8 or Version 9), complete the following procedures to migrate to DB2 10 new-function mode:
- a. Verify that DB2 is stable in conversion mode (from Version 8 or Version 9). For data sharing, verify that all members are stable.
  - b. Tailor the enabling-new-function jobs.
  - c. Change to enabling-new-function mode (from Version 8 or Version 9) to convert the catalog.
  - d. Start new-function mode.

**Related tasks:**

Chapter 7, “Installing, migrating, and enabling DB2 data sharing,” on page 711

**From V8**

Premigration Checklist for migration to DB2 10 conversion mode from DB2 Version 8

**From V8**

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 Version 8

**From V8**

**From V9.1**


Premigration Checklist for migration to DB2 10 conversion mode from DB2 9

**From V9.1**


**From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9

**From V9.1**

 Installing the RACF access control module (RACF Access Control Module Guide)

**Related reference:**

 z/OS Parallel Sysplex Configuration Overview (IBM Redbooks)

**Related information:**

 DB2 10 for z/OS Technical Overview (IBM Redbooks)



---

## Chapter 2. Preparing your system to install or migrate to DB2 10

The key to a successful installation or migration of DB2 is planning. Prepare your environment and system before you begin installing or migrating.

### Before you begin

Familiarize yourself with the various changes that DB2 10 introduces, as summarized in Summary of changes in DB2 10 for z/OS (DB2 for z/OS What's New?).

### About this task

Plan the amount of direct-access storage and virtual storage that you need. Planning and coordinating with other DB2 subsystems is essential if you plan to install the distributed data facility (DDF). Review the values that are needed for the parameters on the installation and migration panels. By planning in advance, your task of filling in the parameters becomes easier.

#### Related tasks:


Checklist for migration to DB2 10 conversion mode from Version 8

Checklist for migration to DB2 10 conversion mode from Version 9

Premigration checklist for migration to conversion mode from Version 8

Premigration checklist for migration to DB2 10 conversion mode from Version 9

Running the installation CLIST

 Controlling connections to remote systems (DB2 Administration Guide)

---



## Hardware and software requirements for DB2



Before you can install or migrate DB2 10, you must fulfill the hardware and software requirements.

You must migrate to a z/OS Version 1 Release 10 or later environment before installing or migrating to DB2 DB2 10. DB2 10 for z/OS operates on z990, z890, z9<sup>®</sup>, z10<sup>™</sup>, and subsequent 64-bit z/Architecture<sup>®</sup> processors.

See the DB2 Program Directory for information about system requirements.

#### Related tasks:

 From V8 Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8  From V8

 From V9.1 Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1  From V9.1

---

## Required maintenance for DB2 10 installation or migration

In addition to ensuring that you have required hardware and software products installed, you must ensure that required service changes for DB2 10 have been applied.

To help you identify required service, z/OS Version 1 Release 10 (or any subsequent release) introduces enhanced HOLDDATA, which provides several advantages over previous HOLDDATA. One advantage is the addition of fix categories (FIXCATs), which provide a simplified, automated method of identifying and applying missing PTFs that are required for installation or migration or to support specific product functions. You can use this automated process instead of manually reviewing Preventive Service Planning (PSP) buckets, identifying service that is already installed, and applying missing PTFs.

For more information about enhanced HOLDDATA and available FIXCATs, see [Enhanced HOLDDATA for z/OS and OS/390](#).

**Related concepts:**

 [DB2 Program Directories \(\)](#)

---

## Storage requirements for DB2

When you install or migrate DB2, consider the size of your site and how it will be set up to determine your storage needs.

You can use the installation CLIST to calculate your estimated storage needs. For details, see [Calculating storage requirements with the installation CLIST](#).

The parameters that you specify when you run the installation CLIST affect the sizes of some data sets and the required amount of virtual storage. All data sets are linear data sets, with the exception of the bootstrap data set, which is a key-sequenced data set.

You can use Data Facility Storage Management Subsystem (DFSMS) to manage DB2 data sets. It provides automatic backup and recovery features, which might require disk storage beyond what is estimated below. Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

**Note:** If any preallocated shadow data sets for the REORG utility exist, you might need to create the shadow data sets on the SMS volumes so that the first REORG on this table space in DB2 10 is able to convert them to SMS-managed.

**Related concepts:**

[Storage estimates for data sharing environments](#)

 [DFSMSHsm Storage Administration Reference](#)

**Related tasks:**

 [From V8](#)

[Premigration checklist for migration to DB2 10 conversion mode from DB2 9](#)

 [From V8](#)



From V9.1

Premigration checklist for migration to DB2 10 conversion mode from DB2 9.1

From V9.1

**Related reference:**

DSNTIPC: CLIST calculations panel 1

**Related information:**

 DB2 for z/OS Program Directories

## Calculating storage requirements with the installation CLIST

By providing information about the sizes of your DB2 environment, you can use the installation CLIST to calculate certain storage requirements for your DB2 subsystem.

### About this task

The CLIST contains the algorithms that DB2 uses to calculate storage based on the parameters that you supply during installation or migration.

### Procedure

1. Run the installation CLIST, as described in Running the installation CLIST.
2. In the INSTALL TYPE field on panel DSNTIPA1, specify INSTALL. If you specify MIGRATE for the INSTALL TYPE field, DB2 10 uses values from DB2 9 instead of running the CLIST calculations.
3. On panel DSNTIPD, specify field values that describe the size of your DB2 environment. Specify integer values, not fractions. You can use K (as in 32 K) for multiples of 1024 bytes and M (as in 16 M) for multiples of 1,048,576 bytes in most fields. do not exceed the maximum value that is accepted by the field.  
The CLIST uses the values that you specify to calculate storage requirements. You can see the calculation results on the fields of the CLIST calculations panel: DSNTIPC.
4. On panel DSNTIPC, specify whether to accept the calculated values.  
The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:
  - To accept the calculated value, ensure that the **Override** column contains no value.
  - To override the calculated value, specify a value in the **Override** column.

### What to do next

If you want to examine the algorithms that DB2 uses for the CLIST calculations, that DB2 uses, print or edit the installation CLIST and REXX EXEC. The DSNTCALC EXEC contains most of the data set calculations.

**Related reference:**

DSNTIPD: Sizes panel 1

DSNTIPC: CLIST calculations panel 1

DSNTIPA1: Main panel

## DB2 subsystem storage requirements

You must configure storage sizes for your DB2 subsystem.

You can use the installation CLIST to calculate storage requirements for your DB2 installation. For details, see *Calculating storage requirements with the installation CLIST*.

If you do not accept the default values, you can calculate the storage that you need for the DB2 data sets by using the information in *Active log data sets storage requirements*. For other data sets, you can use the formulas in the CLIST. After calculating the required storage for each data set, you can calculate the total requirements.

When you are estimating storage needs, you must also consider whether you are using extended address volumes. If you use extended address volumes, you need to add 10 cylinders for each object in the cylinder-managed space of an extended address volume. The following table shows which DB2 data sets can reside in the extended addressing space of an extended address volume for each z/OS release.

*Table 1. Data sets that can reside in extended address spaces*

	Data sets allowed in extended addressing space of z/OS 1.10?	Data sets allowed in extended addressing space of z/OS 1.11?	Data sets allowed in extended addressing space of z/OS 1.12?
Tables and indexes	Yes	Yes	Yes
BSDS	Yes	Yes	Yes
Active logs	Yes	Yes	Yes
Archive logs	No	Yes (extended format sequential data sets)	Yes
Utilities sequential input and output data sets	No	Yes (extended format sequential data sets)	Yes
Utilities partitioned data sets and PDSEs	No	No	Yes
Sort work data sets	No	No	Yes
DB2(r) installation data sets (CLISTs, panels, samples, macros, and so on)	No	No	Yes
SDSNLINK, SDSNLOAD	No	No	Yes

### Related reference:

DSNTIPD: Sizes panel 1

### Related information:

 [DB2 for z/OS Program Directories](#)

## DB2 catalog storage requirements

Estimated storage requirements for the DB2 catalog include space for the entire set of DB2 catalog data sets and their indexes.

Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2

catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time that the related table space is reorganized.

Estimated storage requirements are shown in the table below.


*Table 2. Estimated space requirements (in cylinders) for the DB2 catalog by site size*

Site size	3390
Small	224
Medium	436
Large	727
Extra-large	1017

If you plan to use partitioned table spaces that are created with (or will grow to have a large number of) partitions, you might need to allocate more storage than what is suggested in the table above. Some catalog objects can grow substantially over time if a large number of partitions are created or added to table spaces.

**Related tasks:**

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

 Changing catalog and directory size and location (DB2 Performance)

**Related reference:**

DSNTIPC: CLIST calculations panel 1

**DB2 directory storage requirements**

The amount of directory space required for the DB2 directory depends mainly on the number of user databases, application plans and packages, and tables in the DB2 subsystem.

Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

Storage requirements for the DB2 directory are shown in the table below.

*Table 3. Estimated space requirements (in cylinders) for the DB2 directory by site size*

Site size	3390
Small	84
Medium	278
Large	543
Extra-large	808

If you plan to use partitioned table spaces that are created with (or will grow to have) a large number of partitions, you might need to allocate more storage than what is suggested in the table above. Some directory objects can grow substantially over time if a large number of partitions are created or added to table spaces.

**Related tasks:**

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

**Related reference:**

DSNTIPC: CLIST calculations panel 1

## **Active log data sets storage requirements**

Active log data sets record significant events and data changes. Active log data sets are periodically offloaded to archive log data sets. Storage requirements for active log data sets depend on the frequency of data updates and of offloads to archive log data sets.

If you use 3390 volumes, use a single primary extent, and ensure that the allocation for each active log data set does not exceed the following values:

- 87,375 tracks, if allocated in units of tracks
- 5825 cylinders, if allocated in units of cylinders

If the archive logs are written to tape, a large data set might require two tapes instead of one. For real tape, space might also be wasted on the tapes. Therefore, you must adjust your data set sizes that are based on the size of your real or virtual tapes. Most tape products use compaction. You can also use DFSMS to compress the archive log data sets.

You must also consider that the size of each archive log data sets is the same as the size of your active log data sets. If the archive logs are written to tape, a large data set might require two tapes instead of one. For real tape, space space might also be wasted on the tapes. Therefore, you must adjust your data set sizes that are based on the size of your real or virtual tapes. Most tape products use compaction. You can also use DFSMS to compress the archive log data sets.

When DB2 fills up one active log data set, it must offload the log data to an archive log data set. At the same time, DB2 begins writing to the next active log data set. When DB2 reaches the last active log data set, it starts again with the first active log data set. However, if the applications catch up to the offload process, the applications are suspended until the offload process can finish writing the next active log data set. Such application suspensions often happen because of the following situations:

- Large batch jobs that insert, update, or delete data.
- Frequent inserts.
- Logging of large LOBs.
- The offload operation is too slow.

To prevent such application suspensions, you can use any of the following approaches:

- Enable fast offload operations. For example, you might place the archive log data sets on a disk device that has fast channels. (You might move the data sets to tape later.)
- Use the zEDC compression feature.

- Allocate a large amount of active log space to support sustained bursts of insert, update, delete activity. DB2 supports as many as 93 active log data sets with a maximum size of 4 GB each. This limit provides up to 372 GB of active log space. You must double the space calculation for dual logging. In many cases, fewer than the maximum number of data sets can be used. Two data sets might be sufficient. However, the more log space that you allocate, the larger a burst of insert, update, and delete operations can be without causing performance problems.

During startup, DB2 allocates the BSDS data set, all of the active log data sets, and, when dual logging is used, all secondary log data sets. When in a data sharing group, DB2 also allocates peer BSDS data sets and active log data sets as necessary during execution. To avoid exhausting the space in the MVS task I/O table (TIOT) for the DB2 master address space, which can cause DB2 to fail, perform the following actions:

1. Set the MVS TIOT size to 64K in the ALLOCxx PARMLIB member.
2. Specify NON\_VSAM\_XTIOT=YES in the DEVSUPxx PARMLIB member to enable DB2 to use the MVS extended task I/O table (XTIOT) when allocating offload data sets.
3. Specify a dynamic volume count (DVC) of 0 for any SMS data set class that is used to allocate a DB2 BSDS, active log, or secondary log data set.
4. Reallocate any existing BSDS, active log, or secondary log data sets that were allocated with a DVC greater than 0.

Also, as a rule, reading active log data sets is faster than reading archive log data sets, even if the archive log data sets are stored on disk. (A possible exception to this rule is if you use DFSMS compression for the archive logs.) If your recovery performance depends on the speed of reading the logs, then recovery performance can benefit from having as many active log data sets as possible.

Consider the amount of log data that is written and archived each day. For example, assume you want the ability to restore the database to a point in time 48 hours ago and apply the log records from the past 48 hours with good performance. In that case, you must retain 48 hours of log data on disk. If your applications generate 100 GB of log data per day, you need 200 GB of log space on disk, to apply two days of log records from disk. All 200 GB can be saved in active log data sets if you allocate enough space. If you do not allocate enough space, then the rest of the log data must be read from archive log data sets.

How you plan to manage database recovery and how you manage your archive log data sets are closely related. If your archive log data sets are on tape (no matter whether they are virtual or real tapes), two recover jobs cannot allocate the same tape at the same time. Contention is worse if multiple data sets are stored on a single tape. For that reason, it is often best if the archive logs are stored on real disk devices instead of tape.

However, you can use the following alternative approaches to reduce the cost of storing the archive logs:

- Use inexpensive nearline drives for the archive logs.
- Store the archive log data sets on tape, and recall the archive log data sets from tape to disk before you submit recovery jobs.
- Tolerate slow recovery.

However, remember as you plan for managing DB2 logs, that it is too late to change your approach when you must recover your DB2 database.


## Checkpoint frequency

The CHECKPOINT TYPE field on panel DSNTIPL1 specifies whether the frequency of system checkpoints is controlled by number of consecutive log records, number of minutes, or both. The RECORDS/CHECKPOINT field and MINUTES/CHECKPOINT field on panel DSNTIPL1 determine the number of log records between checkpoints or the number of minutes per checkpoint. When you choose a value for the checkpoint frequency, you must consider the trade-offs between the costs of frequent subsystem checkpoints and the time that is needed to restart a DB2 subsystem after a termination without a quiesce. If the checkpoint value is more than 1,000,000 log records, the time that is needed to restart DB2 after a termination without a quiesce can grow to over 15 minutes. Typical values for the checkpoint frequency are in the range of 500,000 - 1,000,000 log records or 2 - 5 minutes.

## Change data capture

When tables are defined with the DATA CAPTURE CHANGES option, the entire before-image of an updated row is captured on the log. This additional information can represent an increase in log data that is compared to tables that are not defined with the DATA CAPTURE CHANGES option, depending on whether the table contains fixed-length or variable-length rows.

### Related concepts:

 [Logging environment for data sharing \(DB2 Data Sharing Planning and Administration\)](#)

### Related tasks:

 [Improving log capacity \(DB2 Performance\)](#)

### Related reference:


DSNTIPL1: Checkpoint parameters

## Bootstrap data sets storage requirements

Each bootstrap data set (BSDS) requires 6 MB. During installation, DB2 automatically allocates two copies of the BSDS. During migration, DB2 10 adopts the BSDS characteristics that you specified for your previous version.

That is, if you specified two copies of the BSDSs for your previous version, you will have two copies for DB2 10. Keeping two copies of the BSDS is strongly recommended. The total space requirement is about 15 MB for both BSDSs. The BSDSs at any size site require about 10 cylinders of 3390 storage.

### Related concepts:

 [Management of the bootstrap data set \(DB2 Administration Guide\)](#)

## Work file database storage requirements

The work file database is used as storage for processing SQL statements that require working storage.

Work file storage is used for sorting, RID pool overflow to work files, and for temporary tables and common table expressions.

### From V8

As of DB2 9, the TEMP database is no longer used. If you are migrating a non-coexisting Version 8 system, you can reclaim storage that is associated with a

Version 8 TEMP database by dropping the TEMP database and redefining the storage to be used for the work file database. If storage space is not a problem, wait to drop the TEMP database until you are sure that you do not need to fall back to Version 8. If you fall back to Version 8 and you dropped the TEMP database during migration, you have to re-create it after fallback.

**From V8**

The following table shows the disk requirement estimates for the temporary work files in the work file database. Other work file database storage requirements relate to migration.

If you are installing DB2, see *Storage requirements for installation*, below.

*Table 4. Estimated space requirements (in cylinders) for the work file database by site size*

Site size	3390
Small	29
Medium	29
Large	456
Extra-large	712

## Storage requirements for migration

The migration job DSNTIJTC creates and updates indexes on catalog tables. These indexes are created and updated sequentially during migration. The work file database is used for the sort of each index; DB2 needs enough work file storage to sort the largest of the indexes that are listed in the table below. The migration fails if you do not have enough storage. Therefore, ensure that you have enough space before you begin.

**From V8**

**PSPI**

For migration from Version 8, the following indexes are new and changed for existing catalog tables.

*Table 5. Indexes that are added or updated sequentially using the work file database (for migration from Version 8)*

Catalog table name	Index name	Column names
SYSIBM.SYSCOLAUTH	SYSIBM.DSNACX02	CREATOR, TNAME, TIMESTAMP
	SYSIBM.DSNACX03	GRANTOR, GRANTORTYPE, CREATOR, TNAME, TIMESTAMP
	SYSIBM.DSNACX04	GRANTEE, GRANTEEType, CREATOR, TNAME, TIMESTAMP
SYSIBM.SYSCOLUMNS	SYSIBM.DSNDCX05	TBCREATOR, TBNAME
SYSIBM.SYSDBAUTH	SYSIBM.DSNADH01	GRANTEE, NAME, GRANTEEType
	SYSIBM.DSNADH02	NAME
	SYSIBM.DSNADX01	GRANTOR, NAME, GRANTORTYPE
SYSIBM.SYSDBRM	SYSIBM.DSNDBX01	PLNAME
	SYSIBM.DSNDBX02	PLNAME, NAME

Table 5. Indexes that are added or updated sequentially using the work file database (for migration from Version 8) (continued)

Catalog table name	Index name	Column names
SYSIBM.SYSFIELDS	SYSIBM.DSNDFX01	TBCREATOR, TBNAME, NAME
SYSIBM.SYSINDEXES	SYSIBM.DSNDXX07	TBCREATOR, TBNAME
SYSIBM.SYSINDEXPART	SYSIBM.DSNDRX03	IXCREATOR, IXNAME
SYSIBM.SYSKEYS	SYSIBM.DSNDKX02	IXCREATOR, IXNAME
	SYSIBM.DSNDKX03	IXCREATOR, IXNAME, COLSEQ
SYSIBM.SYSPACKAUTH	SYSIBM.DSNKAX01	GRANTOR, LOCATION, COLLID, NAME, GRANTORTYPE
	SYSIBM.DSNKAX02	GRANTEE, LOCATION, COLLID, NAME, BINDAUTH, COPYAUTH, EXECUTEAUTH, GRANTEETYPE
SYSIBM.SYSPARMS	SYSIBM.DSNOPX01	SCHEMA, SPECIFICNAME, ROUTINETYPE, ROWTYPE, ORDINAL, VERSION
SYSIBM.SYSPLANAUTH	SYSIBM.DSNAPH01	GRANTEE, NAME, EXECUTEAUTH, GRANTEETYPE
	SYSIBM.DSNAPX01	GRANTOR, GRANTORTYPE
	SYSIBM.DSNAPX02	NAME
SYSIBM.SYSPLANDEP	SYSIBM.DSNGGX05.	DNAME
SYSIBM.SYSRELS	SYSIBM.DSNDLX04	CREATOR, TBNAME, RELNAME
SYSIBM.SYSRESAUTH	SYSIBM.DSNAGH01	GRANTEE, QUALIFIER, NAME, OBTYPE, GRANTEETYPE
	SYSIBM.DSNAGX01	GRANTOR, QUALIFIER, NAME, OBTYPE, GRANTORTYPE
SYSIBM.SYSROUTINEAUTH	SYSIBM.DSNOAX01	GRANTOR, SCHEMA, SPECIFICNAME, ROUTINETYPE, GRANTEETYPE, EXECUTEAUTH, GRANTORTYPE
SYSIBM.SYSROUTINES	SYSIBM.DSNOFX01	NAME, PARM_COUNT, ROUTINETYPE, PARM_SIGNATURE, SCHEMA, PARM1, PARM2, PARM3, PARM4, PARM5, PARM6, PARM7, PARM8, PARM9, PARM10, PARM11, PARM12, PARM13, PARM14, PARM15, PARM16, PARM17, PARM18, PARM19, PARM20, PARM21, PARM22, PARM23, PARM24, PARM25, PARM26, PARM27, PARM28, PARM29, PARM30, VERSION
	SYSIBM.DSNOFX02	SCHEMA, SPECIFICNAME, ROUTINETYPE, VERSION
	SYSIBM.DSNOFX07	NAME, PARM_COUNT, ROUTINETYPE, SCHEMA, PARM_SIGNATURE, PARM1, PARM2, PARM3, PARM4, PARM5, PARM6, PARM7, PARM8, PARM9, PARM10, PARM11, PARM12, PARM13, PARM14, PARM15, PARM16, PARM17, PARM18, PARM19, PARM20, PARM21, PARM22, PARM23, PARM24, PARM25, PARM26, PARM27, PARM28, PARM29, PARM30, VERSION
SYSIBM.SYSSCHEMAAUTH	SYSIBM.DSNSKX01	GRANTEE, SCHEMANAME, GRANTEETYPE
	SYSIBM.DSNSKX02	GRANTOR, GRANTORTYPE
SYSIBM.SYSSEQUENCEAUTH	SYSIBM.DSNWCX02	GRANTOR, SCHEMA, NAME, GRANTORTYPE



Table 5. Indexes that are added or updated sequentially using the work file database (for migration from Version 8) (continued)

Catalog table name	Index name	Column names
	SYSIBM.DSNWCX03	GRANTEE, SCHEMA, NAME, GRANTEETYPE
SYSIBM.SYSSTMT	SYSIBM.DSNPSX01	PLNAME, NAME
	SYSIBM.DSNPSX02	PLNAME, NAME, STMTNOI, STMTNO, SECTNOI, SECTNO, SEQNO
SYSIBM.SYSSYNONYMS	SYSIBM.DSNDYX02	TBCREATOR, TBNAME
SYSIBM.SYSTABAUTH	SYSIBM.DSNATX01	GRANTOR, GRANTORTYPE
	SYSIBM.DSNATX05	TCREATOR, TTNAME, TIMESTAMP
SYSIBM.SYSTABLEPART	SYSIBM.DSNDPX05	DBNAME, TSNAME
SYSIBM.SYSTABLES	SYSIBM.DSNDTX05	DBNAME, TSNAME
SYSIBM.SYSUSERAUTH	SYSIBM.DSNAUH01	GRANTEE, GRANTEDTS, GRANTEETYPE
	SYSIBM.DSNAUX02	GRANTOR, GRANTORTYPE
SYSIBM.SYSVIEWDEP	SYSIBM.DSNGGX06	DCREATOR, DNAME, DTYPE
SYSIBM.SYSVOLUMES	SYSIBM.DSNSSH02	SGNAME

PSPI

From V8

From V9.1

PSPI

For migration from DB2 9, the following indexes are new and changed for existing catalog tables.

Table 6. Indexes that are added or updated sequentially using the work file database (for migration from DB2 9)

Catalog table name	Index name	Column names
SYSIBM.SYSCOLAUTH	SYSIBM.DSNACX02	CREATOR, TNAME, TIMESTAMP
	SYSIBM.DSNACX03	GRANTOR, GRANTORTYPE, CREATOR, TNAME, TIMESTAMP
	SYSIBM.DSNACX04	GRANTEE, GRANTEETYPE, CREATOR, TNAME, TIMESTAMP
SYSIBM.SYSCOLUMNS	SYSIBM.DSNDCX05	TBCREATOR, TBNAME
SYSIBM.SYSDBAUTH	SYSIBM.DSNADH02	NAME
SYSIBM.SYSDBRM	SYSIBM.DSNDBX01	PLNAME
	SYSIBM.DSNDBX02	PLNAME, NAME
SYSIBM.SYSFIELDS	SYSIBM.DSNDFX01	TBCREATOR, TBNAME, NAME
SYSIBM.SYSINDEXES	SYSIBM.DSNDXX07	TBCREATOR, TBNAME
SYSIBM.SYSINDEXPART	SYSIBM.DSNDRX03	IXCREATOR, IXNAME
SYSIBM.SYSKEYS	SYSIBM.DSNDKX02	IXCREATOR, IXNAME
	SYSIBM.DSNDKX03	IXCREATOR, IXNAME, COLSEQ
SYSIBM.SYSPLANAUTH	SYSIBM.DSNAPX02	NAME

| Table 6. Indexes that are added or updated sequentially using the work file database (for migration from DB2  
 | 9) (continued)

Catalog table name	Index name	Column names
SYSIBM.SYSPLANDEP	SYSIBM.DSNGGX05.	DNAME
SYSIBM.SYSRELS	SYSIBM.DSNDLX04	CREATOR, TBNAME, RELNAME
SYSIBM.SYSSTMT	SYSIBM.DSNPSX01	PLNAME, NAME
	SYSIBM.DSNPSX02	PLNAME, NAME, STMTNOI, STMTNO, SECTNOI, SECTNO, SEQNO
SYSIBM.SYSSYNONYMS	SYSIBM.DSNDYX02	TBCREATOR, TBNAME
SYSIBM.SYSTABAUTH	SYSIBM.DSNATX05	TCREATOR, TTNAME, TIMESTAMP
SYSIBM.SYSTABLEPART	SYSIBM.DSNDPX05	DBNAME, TSNAME
SYSIBM.SYSTABLES	SYSIBM.DSNDTX05	DBNAME, TSNAME
SYSIBM.SYSVIEWDEP	SYSIBM.DSNGGX06	DCREATOR, DNAME, DTYPE
SYSIBM.SYSVOLUMES	SYSIBM.DSNSSH02	SGNAME

PSPI

From V9.1

You might need more storage for the work file database if you have a large amount of data to sort and a large amount of concurrent sort activity. If you are sorting compressed data, allow for the same amount of storage that you would need if the data were not compressed. The maximum amount of storage that you need is enough to satisfy the requirements of the largest combination of concurrent activities that use the work file database. The amount of storage that is required for a sort depends on the following variables:

- Data size
- Sort key size

You can estimate the total amount of work file space that is needed to perform the sort as follows:

- Let *MIN* be the operation of selecting the lowest value from a set of values.
- Let *FLOOR* be the operation of discarding the decimal portion of a real number.
- Let *CEILING* be the operation of rounding a real number up to the next-highest integer.
- Let *Data* be the total data length in bytes.
- Let *Key* be the total length of the sort key.
- Let *Prefix* be the 16-byte header.
- Let *Rows* be the total number of rows that are being sorted.

Then calculate as follows:

$$\text{Records per page} = \text{MIN}(\text{MAXROWS}, \text{FLOOR} (4076 / (\text{Data} + \text{Key} + \text{Prefix})))$$

$$\text{Total pages} = \text{CEILING} (\text{Rows} / \text{Records per page})$$

$$\text{Total segments} = \text{CEILING} (\text{Total pages} / 24)$$

The number of records per page cannot exceed 255 (the value of MAXROWS).

This result tells you how much storage is needed in the work file database after sort processing. However, if a merge phase was required during sort processing, an additional intermediate copy of the records might exist at any given time. For most subsystems, you can assume that about half of the records that are involved in a sort have two copies. Therefore, a multiplier value of 1.5 is safe. If you want to be conservative, choose 2 for your multiplier value. Therefore, the amount of storage that is used in the work file database during sort processing can vary from 1 to 2 times the storage that is needed after sort processing. The actual storage that is used might also increase if you have little available buffer pool storage.

When a large object (LOB) column is part of a result table, and the result table must be placed in a work file for sorting, the actual LOB column data is not placed in the work file. Therefore, LOB columns do not require large increases in the amount of work file space that DB2 requires. For work file calculations, you can assume 51 bytes of storage per LOB column for the work file.

However, if a large object (LOB) column is defined with the `INLINE` attribute and the result table must be placed in a work file, the inline LOB data will be placed in the work file. Therefore, work file calculations need to account for the length of the inline LOB.

To determine the number of tracks that are needed, convert the number of pages into bytes, and divide the result by the number of bytes per unit. Let  $r$  be the number of 4096-byte records per track, and let *safety\_factor* be a number from 1.5 to 2.0. For 3390 devices,  $r$  is 12.

$Tracks = \text{CEILING}(\text{Total pages} / r) * \text{safety\_factor}$

**Example 1:** Consider a table (TABLE1) that contains 45,327 rows, for which you want to create a **nonunique padded index** on COL1 CHAR(3) NOT NULL, COL2 CHAR(4), COL3 VARCHAR(20), and COL4 SMALLINT. Determine the amount of temporary storage that DB2 needs to create this index as follows:

- $Data = 3 + (4 + 1) + (20 + 1) + (2 + 1) + 4 = 36$
- $Key = 36$  (*Data* plus RID is key for CREATE INDEX)
- $Rows = 45,327$
- $Records\ per\ page = \text{MIN}(\text{MAXROWS}, \text{FLOOR}(4076 / (36 + 36 + 6))) = 52$
- $Total\ pages = \text{CEILING}(45,327 / 52) = 872$
- $Segments = \text{CEILING}(872 / 24) = 37$
- $Tracks = \text{CEILING}(872 / 12) * 1.5 = 111$

Example 1 is a data page calculation for storing index keys in the work file database. For this example, 111 tracks of a 3390 storage device are needed. The 2-byte length field of a VARCHAR column is not a part of *Data* for CREATE INDEX. The RID field is a part of *Data*, and the *Key* includes the entire *Data* portion, including the RID.

**Example 2:** Consider TABLE1 again and the following SQL query:

**GUPI**

```
SELECT COL1,COL2,COL3,COL4
FROM TABLE1
ORDER BY COL2,COL3,COL1;
```

This query, which includes an ORDER BY clause, requires a sort. Determine the amount of temporary storage that is required for this table as follows:

- $Data = 3 + (4 + 1) + (20 + 2 + 1) + (2 + 1) = 34$
- $Key = (4 + 1) + (20 + 1) + 3 = 29$
- $Rows = 45\ 327$
- $Records\ per\ page = \text{MIN}(\text{MAXROWS}, \text{FLOOR}(4076 / (34 + 29 + 6))) = 59$
- $Total\ pages\ (final\ result) = \text{CEILING}(45\ 327 / 59) = 769$
- $Segments\ (final\ result) = \text{CEILING}(769 / 24) = 33$
- $Total\ pages\ (during\ processing) = \text{CEILING}(1.5 * 769) = 1154$
- $Segments\ (during\ processing) = \text{CEILING}(1.5 * 35) = 53$
- $Tracks = \text{CEILING}(1238 / 12) = 104$

For this example, which is a table calculation, 104 tracks of a 3390 storage device are needed. The 2-byte length field of a VARCHAR column is a part of *Data* for CREATE INDEX. The RID field is not a part of *Data*, and the *Key* does not include the entire *Data* portion.

You can use the sort summary trace record, IFCID 0096, to simplify some of the calculations. This record shows the number of records that are sorted, the sort record size (*Data* + *Key*), and an indication of whether a merge phase was required for an individual sort request.

Also note that if the overall record length (*Data* + *Key* + *Prefix*) exceeds 100 bytes, DB2 attempts to create the work file in a table space with a 32 KB page size. If the overall record length is 100 bytes or less, DB2 uses a table space with a 4 KB page size. Therefore, you must have at least one 4 KB work file table space and one 32 KB work file table space.

## Storage requirements for installation

If you are installing DB2, use the following calculations to determine either PRIQTY (primary space allocation) or DSSIZE and MAXPARTITION values for creating work file table spaces. During installation, you must create at least one 4 KB work file table space and one 32 KB work file table space.

### For 4 KB work file table spaces:

- Let *total space* be the total amount of space in megabytes (from the TEMP 4K SPACE field on panel DSNTIP9).
- Let *table spaces* be the number of table spaces (from the TEMP 4K TBL SPACES field on panel DSNTIP9).
- Let CEILING be the operation of rounding a real number up to the next-highest integer.
- Let *GB per table space* be the amount of space per work file table space in gigabytes.

Calculate the following:

$$GB\ per\ table\ space = \text{CEILING}(total\ space / table\ spaces / 1024)$$

If *GB per table space* < 1 GB, then PRIQTY = CEILING(*total space* / *table spaces*)

If *GB per table space* ≤ 16 384 GB, then DSSIZE = 4 GB

and MAXPARTITIONS = *GB per table space* / 4

Otherwise, DSSIZE = 4 GB and MAXPARTITIONS = 4096

**For 32 KB work file table spaces:**

- Let *total space* be the total amount of space in megabytes (from the TEMP 32K SPACE field on panel DSNTIP9).
- Let *table spaces* be the number of table spaces (from the TEMP 32K TBL SPACES field on panel DSNTIP9).
- Let CEILING be the operation of rounding a real number up to the next-highest integer.
- Let *GB per table space* be the amount of space per work file table space in gigabytes.

Calculate the following:

$GB\ per\ table\ space = CEILING (total\ space / table\ spaces / 1024)$

If *GB per table space* < 1 GB, then  $PRIQTY = CEILING (total\ space / table\ spaces)$

If *GB per table space* ≤ 16 384 GB, then  $DSSIZE = 4\ GB$


and  $MAXPARTITIONS = GB\ per\ table\ space / 4$

If *GB per table space* ≤ 131 072 GB, then  $DSSIZE = 32\ GB$


and  $MAXPARTITIONS = GB\ per\ table\ space / 32$

Otherwise,  $DSSIZE = 32\ GB$  and  $MAXPARTITIONS = 4096$

**Related concepts:**

 [Diagnostic traces for attachment facilities \(DB2 Administration Guide\)](#)

**Related tasks:**

 [Changing your work database for a migrated installation of DB2 \(DB2 Administration Guide\)](#)

**Related reference:**

DSNTIPC: CLIST calculations panel 1

**Temporary table space storage requirements:**

DB2 uses declared temporary tables for processing some types of scrollable cursors.

**GUPI**

The following scrollable cursors require declared temporary tables:

- SENSITIVE STATIC SCROLL.
- INSENSITIVE SCROLL.
- ASENSITIVE SCROLL, if the effective cursor sensitivity is INSENSITIVE. A cursor that meets the criteria for a read-only cursor has an effective sensitivity of INSENSITIVE.

Before application programmers can use cursors that require declared temporary tables, you need to ensure that the work file database exists. You also need to create temporary table spaces for the declared temporary tables that are large enough to process your cursors. For example:

```
CREATE TABLESPACE DTTTS IN WORKFILE  
  SEGSIZE 4;
```

If more than one table space in the work file database is in the subsystem, DB2 chooses the table spaces to use for static scrollable cursors.

**GUPI**

**Important:** If you use declared temporary tables, you must define at least one of the table spaces in the work file database to have a page size of 32 KB or greater.

### **Calculating the size of the longest row in the declared temporary table:**

The page size of the table space in the work file database must be large enough for the longest row in the declared temporary table. A row in the declared temporary table might be considerably larger than the row in the table for which the static scrollable cursor is used.

#### **About this task**

The size of the row depends on these factors:

- The number of columns that are stored in the declared temporary table
- The size of each column

The number of columns in the declared temporary table depends on these factors:

- The number of columns in the select list of the SELECT statement for the cursor
- The number of expressions in the select list that contain more than a single column name
- If the SELECT statement contains an ORDER BY clause, the number of columns in the ORDER BY clause
- An indication of whether the result table is read-only

#### **Procedure**

To calculate the size of the longest row in the declared temporary table:

1. Identify the columns in the declared temporary table.

For a read-only result table, the following items are columns in the declared temporary table:

- Each expression in the select list
- Each column in the ORDER BY clause that is not in the select list
- One additional column that DB2 generates

For a result table that is not read-only, the following items are columns in the declared temporary table:

- Each column in the select list
- Each expression in the select list that contains more than a single column name
- Three additional columns that DB2 generates

2. Determine the length of each column in the declared temporary table.

- a. For columns other than the columns that DB2 generates, determine the data type of each column. See Retrieving catalog information about columns (DB2 Administration Guide) for more information about determining column data types.

Determine the length of each column, based on the data type, in the following way:

- For a declared temporary table column that is the result of the concatenation of CHAR, VARCHAR, GRAPHIC, or VARGRAPHIC data types, use the information in Retrieving catalog information about columns (DB2 Administration Guide) to determine the column length. Add 1 byte if the column is nullable.

- For a declared temporary table column that is the result of an expression that contains LOB columns, specify a length of 120 for each column, literal, or host variable that is referenced in the expression. Then add these lengths for the expression.
  - For a LOB data type, specify a length of 120.
  - For a ROWID data type, specify a length of 42.
  - For a declared temporary table column of any other data type, use the information in Retrieving catalog information about columns (DB2 Administration Guide) to determine the column length. Add 1 byte if the column is nullable.
- b. For the columns that DB2 generates, determine the total length for those columns in the following way:
- If the result table of cursor is read-only, the length for the added column is 22 bytes.
  - If the result table of cursor is not read-only, the total length for the three added columns is 33 bytes.
3. Find the sum of the column lengths that you calculated in the previous step.

### Example

Suppose that table T1 has the following columns and data types.

C1 CLOB(100M)  
 C2 CHAR(10)  
 C3 VARCHAR(100) NOT NULL  
 C4 INTEGER NOT NULL  
 C5 INTEGER

Now suppose that you declare two scrollable cursors for the table:

#### GUPI

```
DECLARE CUR1 INSENSITIVE SCROLL CURSOR FOR
  SELECT C1, C2 || C3, C4 FROM T1
  WHERE C3 > :HV;
DECLARE CUR2 SENSITIVE STATIC SCROLL
CURSOR FOR
  SELECT C1, C2||C3, C4 FROM T1
  WHERE C3 > :HV;
```

#### GUPI

The result table for cursor CUR1 is read-only. Therefore, the columns, column lengths, and maximum row length of the declared temporary table for CUR1 are as follows:

Column	Data type	Effective length
C1	CLOB(100M)	120
C2    C3	VARCHAR(110)	113
C4	INTEGER NOT NULL	4

Column	Data type	Effective length
C5	INTEGER	5
One column added by DB2	(N/A)	22
Total length	(N/A)	265

The result table for cursor CUR2 is not read-only, it is read-write. Therefore, the columns, column lengths, and maximum row length of the declared temporary table for CUR2 are as follows:

Column	Data type	Effective length
C1	CLOB(100M)	120
C2	CHAR(10)	11
C3	VARCHAR(100) NOT NULL	102
C4	INTEGER NOT NULL	4
C2    C3	VARCHAR(110)	113
Three columns added by DB2	(N/A)	33
Total length	(N/A)	383

### Default database storage requirements

The size of the default database depends on column lengths, page sizes, and index column lengths. The estimated size of your data, multiplied by 2, usually provides an adequate planning estimate for the default database size.

### Dump data set size storage requirements

When planning for your DB2 subsystem storage, you must reserve enough space for the dump data sets. The storage requirements depend on factors such as the number of dump data sets you have defined and whether you invoke authorized Language Environment<sup>®</sup> functions.

**Recommendation:** Use the following guidelines to estimate storage requirements for the dump data sets:

- Have at least two dump data sets.
- Have approximately 1000 cylinders for all dump data sets.  
If you invoke authorized Language Environment functions, a different style of dump might be generated, which requires approximately 520 cylinders.
- Have 3.25 MB of space for DB2 volatile summary storage data.

Summary data in dumps is usually enough to diagnose most problems. In addition to summary data, DB2 also requests a SDUMP from the operating system to provide these additional storage areas if enough space is available in the dump data set:

- DB2 system services address space
- DB2 database services address space
- DB2 distributed data facility (DDF) address space
- Allied address space of the failing allied task
- IRLM address space for data sharing environments

DB2 passes the following parameters to the SDUMP service aid through the SDATA keyword: SQA, ALLPSA, LSQA, SUMDUMP, and CSA (subpools 231 and 241).



After DB2 SVC dump processing is complete, z/OS issues message IEA911E to indicate whether enough space was available in the dump data set to contain the requested storage areas. If this message indicates that a partial dump was taken, but the 3.25 MB of summary storage is available in the dump, this dump is probably enough for problem diagnosis. Otherwise, IBM Software Support might request that you re-create the problem if storage areas that are required for problem determination are not included in the dump.

## System databases storage requirements

The DB2 installation process automatically creates system databases for the resource limit facility, DDL registration, and EXPLAIN tables that are created under the SYSIBM schema. The storage requirements for these databases depend on the amount of user data that they each contain.

## Archive log data sets storage requirements

If you decide to store the archive log data sets on disk, you need to reserve enough space on the device. The active log data set and the BSDS are both written to the same location. Therefore, you must reserve enough storage for the active log and the BSDS.

**Recommendation:** You should store archive logs on disk, especially if DB2 will be running in data sharing mode.

The total amount of storage that is required for the logs and BSDSs is calculated by the CLIST and displayed in the messages on panel DSNTIPC1.

The amount of space for the archive primary and secondary archive log space are calculated as follows:

The primary space (PRIQTY subsystem parameter) is set to the size of the active log data set. The secondary space (SECQTY subsystem parameter) is set to a quarter the size of the active log data set.

### Related concepts:

Active log data sets storage requirements

Bootstrap data sets storage requirements

### Related reference:


DSNTIPC1: CLIST calculations panel 2

## Profile tables storage requirements

You need to reserve disk space for profile tables.

The amount of required disk space is approximately 100 to 200 MB.

### Related reference:

 [Profile tables \(DB2 Performance\)](#)

## Virtual storage requirements for address spaces

DB2 uses several types of private address spaces, and each type requires storage.

- DB2 distributed data facility (DDF) address space (DSN1DIST)
- IRLM address space (IRLMPROC)
- DB2 system services address space (DSN1MSTR)
- DB2 database services address space (DSN1DBM1)
- DB2 allied agent address spaces
- DB2 stored procedures address spaces (WLM-named)

- DB2 administrative task scheduler address space

DB2 also uses extended common service area (ECSA), 64-bit common storage, and the z/OS Shared Memory Facility.

You might notice that the sample jobs sometimes use a region size of 0 KB. This region size is meant to simplify the installation process in those particular cases. The following topics provide some recommendations about DB2 region sizes. These recommendations are based on average use under normal circumstances on typical systems. Your requirements might be quite different.

### **DB2 distributed data facility address space (DSN1DIST) storage requirements**

The distributed data facility address space supports network communications with other remote systems and execution of database access requests on behalf of remote users.

**Recommendation:** Use the default region size of 0 KB. This address space is started as part of DDF initialization. The start-up procedure is DSN1DIST.

### **IRLM address space (IRLMPROC) storage requirements**

DB2 uses the IRLM to manage locks. When row locking is used, the number of locks that DB2 acquires might increase, which might in turn increase the amount of storage that IRLM requires. The number of locks that are acquired is dependent on your application.

You can estimate the IRLM control block structure at 540 bytes per lock. IRLM no longer supports placing locks in ECSA. All IRLM locks are now placed in the IRLM private address space.

The PC and MAXCSA parameters are no longer used, but you must maintain them for compatibility reasons. You must specify the parameters and values, but their values are not used. The MAXCSA value must be in the range 0-9999. The amount of available storage for IRLM private control blocks, including locks, is determined by the operating system and site-specific IPL parameters. IRLM reserves approximately 10% of the available private storage to be used for must-complete lock requests.

Use the `MODIFY irlmproc,STATUS,STOR` command to view and monitor the amount of private storage that IRLM has available.

You can dynamically adjust the amount of below-the-bar private storage by using the `MODIFY irlmproc SET,PVT` command. This command changes only the monitoring threshold of private storage for IRLM.

You can dynamically adjust the limit for above-the-bar private storage by using the `MODIFY irlmproc SET,MLT` command. This command updates only the MEMLIMIT that z/OS uses to control the amount of above-the-bar storage that can be requested by an address space. A new value remains in effect until the next time IRLM is stopped and restarted or until the `MODIFY` command is issued successfully again.

Neither of these `MODIFY` commands change the physical amount of storage that the operating system assigns to the address space.

Enabling data sharing further increases the storage that IRLM requires. Sysplex query parallelism requires additional storage beyond what is required for data sharing.

**Related reference:**

 [START irlmproc \(z/OS IRLM\) \(DB2 Commands\)](#)

### **DB2 system services address space (DSN1MSTR) storage requirements**

A variety of system-related functions are performed in the DB2 system services address space. The system services address space needs less space than the database services address space.

**Recommendation:** Specify 0 KB for the system services address space. The default start up procedure is DSN1MSTR.

### **DB2 database services address space (DSN1DBM1) storage requirements**

The DB2 database services address space is the largest DB2 address space.

This address space uses storage above the 2 GB bar. The default start up procedure is DSN1DBM1. First, plan for a minimum of 90 MB in this address space, with 2 MB below the 16 MB line.

Most modules reside in the 31-bit extended private area. Storage usage below the 16-MB line is typically less than 2 MB.

### **Allied agent address space storage requirements**

In DB2, any user address space that attaches to DB2 is referred to as an allied agent address space. This address space can include Resource Recovery Services attachment facility (RRSAF), TSO attachment facility, IMS attachment facility, CICS attachment facility, and batch address spaces.

The size of the DB2 attachment facility code in the allied agent address space depends on which attachment facilities you use. TSO requires about 130 KB for the DSN command. CAF, IMS, and RRSAF each require about 36 KB for the DB2 attachment facility code. For all attachment facilities, except CICS Transaction Server and RRSAF, the DB2 attachment facility code must run below the 16 MB line of virtual storage. Applications can run above the 16 MB line.

**Related concepts:**

 [CICS Transaction Server for z/OS DB2 Guide](#)

### **Administrative task scheduler address space storage requirements**

Each DB2 subsystem has a coordinated administrative task scheduler address space that it can start by using a z/OS started task procedure.

Therefore, if there are many DB2 subsystems running on a single z/OS system, there is a separate administrative task scheduler with a separate name for each one.

Two instances of the same administrative task scheduler cannot run simultaneously. To avoid starting up a duplicate administrative task scheduler, at startup the administrative task scheduler checks all of the address spaces control block first to ensure that there is no address space other than itself with the same name. If another address space with the same name is already up and running, the

administrative task scheduler that is starting up immediately shuts down with a console error message. The administrative task scheduler can check only the address spaces that are in the same system, not in the entire Sysplex.

The administrative task scheduler address space stays up, even when DB2 comes down.

### **WLM-established stored procedures address spaces storage requirements**

WLM-established stored procedures address spaces are WLM-established address spaces that can provide multiple isolated environments for stored procedures.

Each WLM-established stored procedures address space is associated with a Workload Manager environment.

DB2 for z/OS stored procedures support both main programs and subprograms; this support requires additional storage for each task control block (TCB). However, because you can run fewer programs in an address space, you can use less storage below the 16 MB line in each address space.


The amount of space that is required by a WLM-established stored procedures address space depends on the applications. Stored procedures that internally store a large amount of in-process work require more space than those that do not store much in-process work. Also, Java stored procedures require more space than others, such as COBOL stored procedures.


The overall amount of required space depends on the number of WLM-established stored procedures address spaces that are running, and the amount of space that is required for each.

#### **Related tasks:**

Setting up a WLM application environment for stored procedures during installation

Setting up a WLM application environment for stored procedures during migration

 Refreshing WLM application environments for stored procedures (DB2 Administration Guide)

 Maximizing the number of procedures or functions that run in an address space (DB2 Performance)

### **Shared memory storage requirements**

*Shared memory* is a type of virtual storage that allows multiple address spaces to easily address storage that is common to DB2 address spaces. This memory resides above the 2 GB bar.

The shared memory object is created at DB2 startup, and all DB2 address spaces for the subsystem (DSN1DIST, DSN1DBM1, DSN1MSTR, and Utilities) are registered with z/OS to be able to access the shared memory object.

To define the size of the shared memory and the 64-bit common area, use the HVSHARE and HVCOMMON parameters of the IEASYSxx member in the parmlib concatenation.

**Restriction:** Ensure that you have defined a high enough value for HVSHARE to satisfy all component requests for shared memory within the z/OS image. The

default value is 510 TB. DB2 10 requires 160 GB of contiguous 64-bit shared private storage for each subsystem above the 2 GB bar. This storage is virtual, and it is controlled by the z/OS HVSHARE parameter in IEASYSxx. This storage is not backed at allocation, only as it is used.

#### PSPI

IFCID 0225 has statistics that you can use to determine the amount of currently defined storage and how much of it is currently allocated.

#### PSPI

#### Related information:

➔ IEASYSxx (symbol definitions and IEASYSxx members) (MVS Initialization and Tuning Reference)

### Common service area storage requirements

Some of the DB2 load modules and control blocks are in common storage. Most of the space is in the extended common service area (ECSA) and 64-bit common storage.

With few exceptions, the CSA-resident load modules are link-edited with the residency attribute of RMODE(ANY). Most of the modules reside in ECSA (above the 16 MB line of virtual storage), as do most of the global control blocks. The IRLM lock control blocks (RHB and RLB) use 64-bit private storage.

Monitor your use of CSA and ECSA, and increase those values if necessary. By monitoring CSA below the 16-MB line, you can determine whether you need to increase the size of the ECSA.

When you IPL z/OS, you can override the CSA size with this syntax:

CSA=(*a*,*b*)

where:

- *a* is the number of kilobytes of CSA storage below the 16 MB line
- *b* is the number of kilobytes of ECSA storage above the 16 MB line

The CSA value is rounded down to the next 1 MB boundary, while the ECSA value is rounded up to the next 1 MB boundary.

To define the size of the 64-bit common area, you can use the HVCOMMON parameter of the IEASYSxx member in the parmlib concatenation.

DB2 10 requires 64-bit common storage. DB2 requires that at least 6 GB of 64-bit common storage is defined for each DB2 subsystem that runs on a z/OS image.

**Restriction:** Ensure that you have defined a high enough value for HVCOMMON to satisfy requirements for all DB2 subsystems plus all other use on the LPAR. The default value is 66 GB. The 6 GB of 64-bit common storage that is requested for each member must be contiguous.

#### Related reference:

➔ Common Service Area (CSA/Extended CSA) (MVS Initialization and Tuning Guide)

### **Calculating the storage requirement for the common service area:**

You need to calculate the approximate storage requirement for the common service area (CSA). Under normal conditions, your virtual storage requirements in the CSA (below the 16-MB line) are unlikely to increase.

#### **About this task**

In a data sharing environment, if an IRLM performs member recovery or structure rebuilding, additional virtual storage is required. Any other increase in the amount of virtual storage that is needed occurs within the extended private area of the DB2 database address space and the extended private area of the distributed data address space.

#### **Procedure**

To calculate the approximate residual requirement for CSA (below the 16-MB line):

1. Start with up to 40 KB for each DB2 subsystem.
2. Add 24 KB for each started IRLM.

### **Calculating the storage requirement for the extended common service area:**

You need to calculate the approximate requirement for the extended common service area (ECSA).

#### **Procedure**

To estimate storage that is needed for ECSA (above the 16-MB line) for each DB2 subsystem:

1. Start with 3 MB of ECSA for the base and the first 100 users.
2. Start with 0.1 MB for IRLM.
3. Add 1.9 MB for IRLM required trace buffers.
4. Add 1.9 MB for IRLM optional trace buffers.
5. Add 4 KB for each additional user.
6. Add 4 KB for each active remote thread.
7. Add 4 MB or more for instrumentation facility interface (IFI) buffers as requested by the monitoring programs.
8. Add up to 1 MB for each concurrently executing DB2 command.

#### **What to do next**

If you use the distributed data functions of DB2, you may find that you need more virtual storage. You can estimate how much your storage needs are likely to increase in the ECSA above the 16-MB line by adding the following amounts:

1. 1 KB for each conversation
2. 2 KB for each thread that uses distributed processing
3. 1 KB for each DB2 site in your network
4. 40 KB for code that relates to distributed processing

Specify this sum or a value that is larger than this sum as the second value of the CSA parameter of the IEASYSxx z/OS logical PARMLIB member. The logical PARMLIB is usually referred to as SYS1.PARMLIB. Specifying values that are too high is preferable to specifying values that are too low; making your values too low can result in a need to IPL z/OS. For example, if the ECSA size is too small,

z/OS places the global load modules and control blocks for DB2 in CSA below the 16-MB line instead of above it. This can cause problems with coexisting z/OS subsystems.

Distributed threads use extended system queue area (ESQA) when they are paused. The amount of storage that is used might vary depending on the z/OS release that is used. Estimate 4 KB of ESQA for every active distributed thread.

## Virtual storage requirements for storage pools and working storage

During the ISPF tailoring session, you specify values that the DSNTINST CLIST uses to calculate main storage size.

**Recommendation:** Determine these values based on your estimated application workload before you install or migrate DB2.

These values provide an estimate of the private area that is needed by the DSN1DBM1 address space, the largest of the DB2 address spaces. If the estimated virtual storage for the address space is not available, you can re-evaluate the sizes that you requested.

The calculations in this topic are planning estimates. The noted values do not provide the exact limits, but they indicate a reasonable range of values.

The sum of the following values must fit the region size that DB2 supports:

- VSAM data set control block storage size
- Working storage size

The CLIST adds a fixed code size to the sum of these values to determine the main storage size.

Storage pools that were previously below the 2 GB bar have now been moved above the 2 GB bar. Their values are no longer included in the region size calculation. These storage pools are the buffer pool, the sort pool, the record identifier (RID) pool, and the environmental descriptor manager (EDM) pool.

After you specify the values listed above, the CLIST calculates the EDM pool size and the size that is needed for the data set control blocks. The CLIST adds the working storage size and the fixed code size to update the region size that is used in the DB2 startup procedures. The CLIST also displays this information on CLIST calculations panel 1: DSNTIPC.

Use the formulas in this topic to estimate your storage needs. For your reference, the default values are included where appropriate.

### Related concepts:

DB2 database services address space (DSN1DBM1) storage requirements

### Related tasks:

 [Calculating virtual storage requirements for a dictionary \(DB2 Performance\)](#)

### Related reference:

DSNTIPC: CLIST calculations panel 1

## Calculating buffer pool size

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All DB2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

### About this task

**Virtual buffer pools:** For best results, use at least 100 KB of buffer pool space for each concurrent user. A value of 300 KB or more is recommended for improved performance. Very simple SQL statements that access small amounts of data can require less than this amount. Complex SQL statements that access large amounts of data can require more than this amount. Dynamic SQL statements might require a dynamic bind, which requires additional buffers for catalog tables and indexes. If an SQL statement requires directory access, additional buffers are also required for directory page sets. UPDATE, DELETE, and INSERT statements require more buffers to keep updated pages in a buffer pool.

To efficiently support prefetch, allow 400 KB for each object that is concurrently accessed. For example, if you have a SELECT statement with a single table space scan, allow 400 KB for that statement. For another example, suppose you have a SELECT statement with a three-table sort merge join that uses an index for each table, and a parallel degree of 4. To obtain a rough estimate, calculate the total number of objects that are accessed and multiply the number of objects by 400 KB and then by the degree of parallelism. In this example, the equation would be (3 tables + 3 indexes + 1 work file for the sort) x 400 KB x 4. The result is 11200 KB that is recommended for this statement. Typically, these objects should be defined in separate buffer pools to provide better performance control. For example, you should have at least three separate buffer pools: one for indexes, one for tables, and one for work files.

During installation, you can set the buffer pool sizes on the installation panels. Later, you can use the ALTER BUFFERPOOL command to alter the sizes and other attributes of as many as 50 buffer pools for 4-KB page sets, 10 buffer pools for 8-KB page sets, 10 buffer pools for 16-KB page sets, and 10 buffer pools for 32-KB table spaces. The ALTER BUFFERPOOL command can make the changes dynamically while DB2 is running.

**Important:** Do not allocate more storage for buffer pools than available real storage for buffer pools. If you attempt to use more than the available real storage, performance will suffer.

DB2 limits the total amount of storage that is allocated for virtual buffer pools to approximately twice the amount of real storage. If you specify more than this amount for virtual buffer pools, DB2 allocates buffer pools during startup until twice the amount of real storage is used. DB2 then allocates the remaining buffer pools as follows:

Page size	Number of pages
4 KB	2000
8 KB	1000
16 KB	500
32 KB	250

After these storage limits have been reached, you cannot increase the amount of



virtual buffer pool storage unless you increase the amount of real storage that is available to the z/OS image.

## Procedure

To calculate the virtual buffer pool sizes for your subsystem:

Use the following table.

Table 7. Virtual buffer pool size calculation

Virtual buffer pool calculation			Default
Buffers for BP0	___ x 4 KB = ___	20 000 x 4 KB	= 80 000 KB
Buffers for BP1	+ ___ x 4 KB = ___	+ 0 x 4 KB	= 0 KB
Buffers for BP2	+ ___ x 4 KB = ___	+ 0 x 4 KB	= 0 KB
.	.	.	.
.	.	.	.
Buffers for BP49	+ ___ x 4 KB = ___	+ 0 x 4 KB	= 0 KB
Buffers for BP8K0	+ ___ x 8 KB = ___	+ 1000 x 8 KB	= 8000 KB
Buffers for BP8K1	+ ___ x 8 KB = ___	+ 0 x 8 KB	= 0 KB
.	.	.	.
.	.	.	.
Buffers for BP16K0	+ ___ x 16 KB = ___	+ 500 x 16 KB	= 8000 KB
Buffers for BP16K1	+ ___ x 16 KB = ___	+ 0 x 16 KB	= 0 KB
.	.	.	.
.	.	.	.
Buffers for BP32K	+ ___ x 32 KB = ___	+250 x 32 KB	= 8000 KB
.	.	.	.
.	.	.	.
Buffers for BP32K9	+ ___ x 32 KB = ___	+ 0 x 32 KB	= 0 KB
	= ___		= 104 000KB

### Related concepts:

[↗](#) Introduction to DB2 data sharing (DB2 Data Sharing Planning and Administration)

[↗](#) Changing the size of the group buffer pool (DB2 Data Sharing Planning and Administration)

### Related tasks:

[↗](#) Deciding how many buffer pools to use (DB2 Performance)

[↗](#) Choosing buffer pool sizes (DB2 Performance)

### Related reference:

DSNTIP1: Buffer pool sizes panel 1

DSNTIP2: Buffer pool sizes panel 2

## Calculating sort pool size

The DB2 sort process uses two kinds of storage: local storage and buffer pool storage. Sort pool storage and buffer pools have storage above the 2 GB bar.

### Related reference:

MAX DATA CACHING field (MXDTCACH subsystem parameter)

## Calculating sort pool storage in local storage:

The sort process creates fixed-length storage pools in local storage for internal sort structures and work areas. Local storage is created above the 2 GB bar at allocation time.

### About this task

The DB2 sort work area (in-memory) has the following storage boundaries for **each** concurrent sort operation:

Minimum sort storage = 240 KB

Maximum sort storage = 128,000 KB

DB2 initially allocates storage for each sort and gradually adds more storage until the maximum sort work area limit is reached or the maximum number of nodes (32,000) are populated at the bottom of the sort tree, whichever occurs first. With 32,000 nodes at the bottom of the sort tree, the average run size for each sorted string is 64,000 records.

The default size of the sort pool is 10,000 KB, but you can override this default value by entering a sort pool size on installation panel DSNTIPC.


### Procedure

To estimate the required storage for a sort pool:

Use the following formula:

$$32000 * (16 + \textit{sort key length} + \textit{sort data length})$$

### Related tasks:

 [Improving the performance of sort processing \(DB2 Performance\)](#)

### Related reference:

DSNTIPC: CLIST calculations panel 1

## Adjusting buffer pool storage that is used for sort work files:

Sort processing uses pages in the DB2 buffer pool for its initial input, for work files that contain intermediate results, and for the final output.

### About this task

The buffer pools are not always dedicated to sort work files. The amount of sort activity determines how much the buffer pools are used. For heavy sort activity, sort records that have been written to the work files are temporarily written to the disk until buffer pool space becomes available.

DB2 considers the buffers that it uses for work files as sequentially accessed pages.

### Procedure

To adjust the percentage of the buffer pool that is used for work files:

Use the VPSEQT parameter of the ALTER BUFFERPOOL command. If a buffer pool is used only for sort work files, you might set VPSEQT to 99%. If the buffer pool is used for sparse indexes or declared global temporary tables, set VPSEQT to 90%. If you do not have enough allocated storage to complete sort processing, you

must allocate more disk space for the work file database.

**Related concepts:**

Work file database storage requirements

**Calculating RID pool size**

The *RID pool* is an area of local storage that is reserved for record identifier (RID) sort processing, including RID list sort processing.

**About this task**

The RID pool is created at startup, but no space is allocated until RID storage is needed. When RID storage is needed, it is allocated above the 2 GB bar in 32 KB blocks, which are known as RID blocks.

Consider the following when you calculate RID pool size:

- Regardless of the current RID pool usage, each agent that requests a new RID map and RID list is granted two (32 KB) RID blocks (1 RID map and 1 RID list).
- If a thread needs another RID list block to be added to the existing RID map and RID list, the next 32 KB block is granted only if the RID pool usage is below the maximum RID pool size. It is possible for the RID pool size to be larger than the setting of the MAXRBLK subsystem parameter because every new agent is granted at least one RID map and one RID list.
- Startup RID storage = 0 (but acquired in 32 KB blocks as needed)

The default size of the RID pool is 400<sup>®</sup>,000 KB, but you can override this default value by entering a RID pool size on installation panel DSNTIPC.


**Procedure**

To estimate the required storage for the RID pool:

Use the following formula:

$$\text{number of concurrent RID processing activities} * \text{average number of RIDs} * 2 * 5 \text{ (bytes per RID)}$$

**Related tasks:**

 [Managing RID pool size \(DB2 Performance\)](#)

**Related reference:**

RID POOL SIZE field (MAXRBLK subsystem parameter)

**Calculating EDM pool sizes**

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

**About this task**

In DB2 10, EDM pools are all located above the 2-GB bar. These pools are the prepared-statement cache pool, the skeleton pool for packages and plans, and the database descriptor (DBD) pool. In previous releases, EDM pool storage was used for thread copies of plans and packages. In DB2 10, this storage use is deprecated, and the thread copies of plans and packages are allocated in other storage areas by EDM.

## Procedure

- If you are migrating to DB2 10, start with the EDM pool sizes that you used in DB2 9, and adjust the sizes as necessary.
- If you are installing DB2 10, the installation CLIST provides initial EDM pool size settings on the CLIST calculations panel 1: DSNTIPC. The calculations are based on your site size. You might need to adjust the settings according to the specific needs of your site.

Table 8. Initial EDM pool settings based on site size

Site size	Initial EMBDBC setting (KB)	Initial EDM_SKELETON_POOL setting (KB)	Initial EMSTMTC setting (KB)
Small	40960	81920	122880
Small-medium	102400	204800	307200
Medium	204800	409600	614400
Medium-large	409600	819200	1228800
Large	819200	1638400	2457600

The following definitions are used to determine site size:

- The small site supports a small number of DB2 users. The small site has about 100 plans, 50 application databases, and 1,000 tables.
- The small-medium site supports more extensive use of DB2 databases. The small-medium site has about 200 plans, 200 application databases, and 4,000 tables.
- The medium site supports heavy use of DB2. The medium site has about 400 plans, 400 application databases, and 8,000 tables.
- The medium-large site supports very heavy use of DB2. The medium-large site has about 600 plans, 600 application databases, and 12,000 tables.
- The large site supports extremely heavy use of DB2. The large site has about 800 plans, 800 application databases, and 16,000 tables.

### Related reference:

DSNTIPC: CLIST calculations panel 1

### Calculating EDM pool space for the prepared-statement cache:

When you use the cache, prepared statements are stored in the EDM pool, as are static SQL statements. The number of prepared statements that are stored in the cache depends on the characteristics of the dynamic SQL statements that your application executes. This EDM pool space is above the 2-GB bar.

### About this task

One type of application typically benefits from caching prepared statements, whereas the other type usually does not. The first type of application uses dynamic SQL statements that are embedded in an application and used repeatedly. Applications and queries with this type of SQL benefit most from caching prepared statements because the statement can be used from the cache. However, applications that contain SQL statements that are infrequently used pay the cost of being added to the cache. For example, queries from QMF™ are likely to be

prepared and executed only once. Caching prepared statements does not benefit applications that extensively use this kind of SQL.

The installation CLIST calculates the size of the EDM pool for the prepared-statement cache and displays this value on panel DSNTIPC. Calculated values of less than 5000 KB are forced to 5000 KB. Values above 1,048,576 KB are reduced to 1,048,576 KB.

### Procedure

To estimate the space that is needed for the prepared-statement cache:

Use the following calculation:

$$EDMSTMC = 4 * [(EDMSCWK * 3) + (EDMSCWK / 8)]$$

*EDMSCWK* is calculated as follows:

$$EDMSCWK = [(NUMTHRDS / 1024) + (NUMPLANS / 4)] * SPCPLANE + 3264$$

where:

- *NUMTHRDS* is the maximum number of concurrent threads (CTHREAD) plus the maximum number of DBATS (MAXDBAT)
- *NUMPLANS* is the number of plans in the subsystem
- *SPCPLANE* is the estimated space for plans. It is calculated as follows:

$$SPCPLANE = TRUNC((NUMSTMTE * NUMSTMTX + 2047) / 1024)$$

where:

- *NUMSTMTE* is the average number of SQL statements that are issued per plan (EXECUTED STMTS field on panel DSNTIPD)
- *NUMSTMTX* is the calculated space for the average SQL statement. It is calculated as follows

$$NUMSTMTX = 1433 + (NUMSTMTL - 1) * 200$$

where *NUMSTMTL* is the average number of tables per SQL statement (TABLES IN STMT field on panel DSNTIPD)

### Calculating EDM pool space for the skeleton copies of packages:

This EDM pool space is above the 2 GB bar and is used to store skeleton copies of packages (SKPT). The initial value for this pool is set by the EDM\_SKELETON\_POOL field on installation panel DSNTIPC.

### About this task

The installation CLIST calculates the value of EDM\_SKELETON\_POOL. Calculated values of less than 5120 KB are forced to 5120 KB. Values above 2,097,152 KB are reduced to 2,097,152 KB.

### Procedure

To estimate the space that is needed for the skeleton copies of packages:

Use the following calculation:

$$EDM\_SKELETON\_POOL = 2 * (max-plans * statement-size * statements-executed + 3264)$$

where:

- *max-plans* is the maximum number of unique plans that you want in the EDM pool at any given time. Estimate this value by taking one fourth of the value of the PLANS field on installation panel DSNTIPD.
- *statement-size* is the average statement size. To calculate the average statement size, add 1.4 KB for the single table statements to the product of 0.2 KB for each additional table in the statement multiplied by one less than the value of the TABLES IN STMT field on installation panel DSNTIPD. (1.4 KB + (0.2 KB \* (TABLES IN STMT -1)))
- *statements-executed* is the average number of executed statements. The CLIST uses the value of the EXECUTED STMTS field on installation panel DSNTIPD.

### Calculating EDM pool space for database descriptors:

The final part of the EDM pool calculation involves the space for database descriptors (DBDs). This portion of the EDM pool is above the 2-GB bar.

#### About this task

The installation or migration CLISTS for data sharing increase the calculated value for DBDs by 25 percent. Calculated values of less than 5000 KB are forced to 5000 KB; values above 2097152 KB are reduced to 2097152 KB.

#### Procedure

To calculate the EDM pool space for database descriptors:

1. Estimate the number of concurrently open databases.
  - Let *NUMCONCR* be the value of the MAX USERS field on installation panel DSNTIPE.
  - Let *NUMCONRM* be the value of the MAX REMOTE ACTIVE field on installation panel DSNTIPE.
  - Let *concplan* be the sum of *NUMCONCR* and *NUMCONRM*.
  - Let *DSCBSIZE* be 16. This is the estimated number of bytes of below-the-line storage per data set, for operating system control blocks, such as allocation, ENQ, and SMF.
  - Let *NUMINDEX* be the estimated average number of indexes per table.
  - Let *NUMTABLE* be the estimated number of tables per database (TABLES field on DSNTIPD).
  - Let *NUMTABSP* be the estimated number of table spaces per database (TABLE SPACES field on DSNTIPD).
  - a. Calculate the maximum number of data sets by using the following formula:
$$\text{MAXMAXDS} = (7400 - \text{concplan}) * 1024 / \text{DSCBSIZE}$$
  - b. Calculate the number of concurrent databases using the following formula:
$$\text{Concurrent\_DBs} = \text{MAXMAXDS} / (\text{NUMTABLE} * \text{NUMINDEX} + \text{NUMTABSP})$$
2. Estimate the average size of the database descriptor.

The database descriptor size is 12 KB for the default values. The database descriptor size depends on the number of table spaces, tables, indexes, columns, partitions, referential relationships, table check constraints, and index keys in the database. The DSNTINST CLIST contains the algorithm for calculating the DBD size. The maximum size of a database descriptor is 25% of

the size of the EDM pool. Therefore, you need to ensure that the EDM pool size is at least four times the estimated size of your largest database descriptor. Estimate the number of table spaces, indexes, tables, referential relationships, and other in the database by using the following variables:

- Let *COLLEN* be the SYSCOLUMNS row length.
- Let *FORLEN* be the SYSFOREIGNKEYS row length.
- Let *IPTLEN* be the SYSINDEXPART row length.
- Let *IXSLEN* be the SYSINDEXES row length.
- Let *KEYLEN* be the SYSKEYS row length.
- Let *NUMCOLUM* be the estimated number of columns per table (COLUMNS field on DSNTIPD).
- Let *NUMINDEX* be the estimated average number of indexes per table.
- Let *NUMINDKY* be the estimated average number of index keys.
- Let *NUMPART* be the estimated average number of partitions per table.
- Let *NUMREL* be the estimated average number of relations per table.
- Let *NUMTABLE* be the estimated number of tables per database (TABLES field on DSNTIPD).
- Let *NUMTABSP* be the estimated number of table spaces per database (TABLE SPACES field on DSNTIPD).
- Let *PCTPTS* be the estimated average percentage of partitioned table spaces.
- Let *RELLEN* be the SYSRELS length row length.
- Let *TABLEN* be the SYSTABLES length row length.
- Let *TPTLEN* be the SYSTABLEPART row length.
- Let *TSPLEN* be the SYSTABLESPACE row length.

a. Calculate the size needed for the table spaces with the following formula:

$$\text{DBD\_TSs} = \text{NUMTABSP} * (\text{TSPLEN} + \text{TPTLEN} * \text{NUMPART} * \text{PCTPTS})$$

b. Calculate the size needed for the indexes with the following formula:

$$\text{DBD\_IXs} = (\text{NUMTABLE} * \text{NUMINDEX} * (\text{IXSLEN} + \text{KEYLEN} * \text{NUMINDKY} + \text{IPTLEN} * \text{NUMPART} * \text{PCTPTS}))$$

c. Calculate the size needed for the tables with the following formula:

$$\text{DBD\_TBs} = \text{NUMTABLE} * (\text{TABLEN} + \text{COLLEN} * \text{NUMCOLUM})$$

d. Calculate the size needed for the referential relationships with the following formula:

$$\text{DBD\_RefReIs} = \text{NUMTABLE} * (\text{NUMREL} + \text{RELLEN} + \text{FORLEN} * \text{NUMINDKY})$$

e. Calculate the size needed for the other factors with the following formula:

$$\text{DBD\_Other} = (\text{NUMTABLE} * (1 + \text{NUMINDEX})) + \text{NUMTABSP}$$

f. Calculate the size needed for the DBD with the following formula:

$$\text{DBD\_size} = [(\text{DBD\_TSs} + \text{DBD\_IXs} + \text{DBD\_TBs} + \text{DBD\_RefReIs} + \text{DBD\_Other} + 4095) / 4096] * 4$$

3. To calculate the total amount of EDM pool space that is needed for DBDs, multiply the number of concurrently open databases by the average size of the database descriptor.

$$\text{Concurrent\_DBs} * \text{DBD\_size}$$

### Calculating data set control block storage

Calculate the data set control block storage requirements by determining the total number of open data sets (DSMAX).

### Procedure

To determine the main storage requirements for your data set control blocks:

- Let *concdb* be the number of concurrent databases, which is specified on installation panel DSNTIPE.
- Let *tables* be the number of tables in each database, which is specified on installation panel DSNTIPD.
- Let *indexes* be the number of indexes in each table. The installation CLIST sets this variable to 2.
- Let *pctpts* be the percentage of partitioned table spaces.
- Let *avgpart* be the average number of partitions in each partitioned table space.
- Let *partts* be the average number of partitioned table spaces per database.
- Let *nonparti* be the number of non-partitioning indexes per partitioned table space.

1. Calculate the total number of open tables with the following formula:

$$\text{opntab} = \text{concdb} * \text{tables}$$

2. Calculate the number of open data sets for partitioned table spaces with the following formula:

$$\begin{aligned} \text{opnptsds} = & \text{opntab} * (\text{pctpts} / 100) * \text{avgpartconcdb} * \\ & (((\text{tables} * \text{indexes}) + \text{tblspaces}) + \\ & ((2 * \text{partts} * \text{avgpart}) - (2 * \text{partts}))) \end{aligned}$$

3. Calculate the number of open data sets with the following formula:

$$\begin{aligned} & \text{concdb} * (((\text{tables} * \text{indexes}) + \text{tblspaces}) + \\ & ((2 * \text{partts} * \text{avgpart}) - (2 * \text{partts}))) \end{aligned}$$

You can modify DSMAX by editing job DSNTIJUZ. The maximum number of concurrently open data sets that is allowed by DB2 is 200,000.

4. To calculate the main storage that is required for your data set control blocks, use the following formula:

$$\text{DSMAX} * 5 \text{ KB}$$

### Example

The default, as calculated by the DSNTINST CLIST, is


$$20000 * 5 \text{ KB} = 100000 \text{ KB}$$

This method of calculation ignores partitioned table spaces and partitioning index spaces. It also assumes that all data sets in the database are open if the database is in use. You could enter a smaller value for the number of concurrent databases if only a few of the data sets in a database are typically opened. The larger the value of DSMAX, the longer data sets stay open.

### Recommendations:

- Move the scheduler work area (SWA) above the 16 MB line of z/OS virtual storage by using JES initialization statements, JES exit routines, or the SMF exit routine (IEFUJV). This way, you can save approximately 1 KB for each open data set in virtual storage below the 16 MB line and avoid potential storage errors. To determine the amount of storage that is needed below the 16-MB line, use 0.016 KB for the multiplication factor if the SWA is above the line or 1.2 KB for the multiplication factor if the SWA is below the line. The preceding calculations and the calculations in the CLIST presume that the SWA is above the line.
- If you do not move the SWA above the 16 MB line, you should not use a DSMAX value greater than 5000.

### Related concepts:

 How DB2 determines the initial value of DSMAX (DB2 Performance)



## Calculating working storage requirements

Working storage is private virtual storage in the DB2 database services address space, which is primarily above the 2 GB bar. Working storage is used to hold temporary data that is needed for the processing of an SQL request.

### About this task

If you use static SQL, you have larger plan sizes, typically varying from 15 KB to 1 MB. Typical sites would use about 300 KB for each thread of working storage for dynamic SQL users, and 100 KB per thread for static SQL users. A *thread* is a structure that describes an application connection to DB2. The CLIST does not include information about open compressed table spaces. Compression dictionaries are stored above the 2-GB bar. Therefore, if you use compressed table spaces, you need additional storage.

### Procedure

To estimate the amount of working storage:

1. Start with 600 KB.
2. Add 40 KB for each concurrent DB2 user. This value is specified by the CTHREAD subsystem parameter.
3. Add 40 KB for each remote DB2 user. This value is specified as the MAXDBAT subsystem parameter.
4. Estimate the amount of working storage that is needed by using the following formula:

$$600 \text{ KB} + (\text{CTHREAD} + \text{MAXDBAT}) * 40 + (\text{CONDBAT} - \text{MAXDBAT}) * 4$$

### Example


The default, as calculated by the DSNTINST CLIST, is:

$$600\text{KB} + (200 + 200) * 40 + (1000 - 200) * 4 = 55800 \text{ KB}$$

#### Related concepts:

 [How DB2 allocates allied threads \(DB2 Performance\)](#)

#### Related tasks:

 [Compressing your data \(DB2 Performance\)](#)

#### Related reference:

MAX USERS field (CTHREAD subsystem parameter)

MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)

MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

## Calculating virtual storage below the 16-MB line

This calculation produces an estimate of virtual storage constraints below the 16-MB line in the DB2 database services address space.

### About this task

Most of the needed virtual storage is in extended private storage and storage above the 2 GB bar, including the buffer pool, the EDM pool, and almost all of the code and working storage. This is the difference between the total storage and the estimated region size. The estimated region size does not include extended private

storage or storage above the 2 GB bar. It includes only the data set control block storage size and some of the code.

### Procedure

To estimate the size of storage below the 16-MB line:

Use the following formula:

$$600 \text{ KB} + \text{MAX USERS} + \text{MAX REMOTE ACTIVE} + (\text{DSMAX} * 0.016)$$

### Example

The default, as calculated by the DSNTINST CLIST, is

$$600 \text{ KB} + 200 + 200 + (9960 * 0.016 \text{ KB}), = 1160 \text{ KB}$$

If the scheduler work area (SWA) is above the 16-MB line, multiply the number of data sets by 0.016 KB; if the SWA is below the 16-MB line, multiply the number of data sets by 1.2 KB.

The CLIST calculations panel, DSNTIPC, displays storage sizes that are calculated by the DSNTINST CLIST.

#### Related reference:

DSNTIPC: CLIST calculations panel 1

## Calculating real storage requirements

DB2 can use real storage to reduce I/O and processor times and to improve response time and throughput. The amount of real storage that DB2 needs varies greatly.

### About this task

Some users find that their organizations need several times the estimates listed below, whereas others need less. The amount of storage is an important parameter in DB2 performance. Performance monitoring programs give you a more accurate estimate of your storage requirements than the formulas in this topic because these programs can take specific environmental characteristics into account.

For the DB2 buffer pools, the EDM pool, log buffers, and working storage, the amount of real storage must be the same as the amount of virtual storage. Paging activity in the buffers is an indication of a problem. If you do not have enough real storage, you might need to reduce your buffer pool size, which allows fewer concurrent users. You also need space to contain locks, the working set of code in all address spaces, log buffers, and common storage space. In DB2 10, log buffers are permanently page-fixed. Therefore, the entire size of the output buffer needs to be used to estimate real storage. Because some of the figures that are used in virtual storage calculations are maximums, whereas the real storage figures typically use activity for the peak, changes are needed in the calculations. The virtual storage figures concentrate on the most constrained address space, but real storage work must include them all. For more information about each category, see the information specified in the first two tables below.

Some storage for castout engines or DASD read and write of a compressed index might be fixed through a PAGEFIX operation. More castout engines or more compressed indexes can cause more storage to be permanently fixed. MVS Real Storage Manager (RSM) controls where the PAGEFIX occurs in real storage, and it

can occur below the 16 MB line. If you have concerns about this behavior, consult with IBM Software Support for MVS RSM.

## Procedure

To estimate real storage requirements:

1. Multiply the virtual size of each storage area by the factor that is indicated in the following table to estimate the real size for that area.

*Table 9. Real storage size calculation*

Category	Default	Virtual size	× Factor	= Real size
Buffer pools	104,200 KB	_____	1.0	_____
Sort pool	10,000 KB	_____	0.5	_____
RID pool	400,000	_____	0.5	_____
EDM pool	33,600 KB	_____	1.0	_____
Data set size	17,928 KB	_____	0.6	_____
Code size + 1100 (4 address spaces)	40,000 KB	40,000 KB	0.5	20,000 KB
Working storage + (DSCF + DDF)	55,800 KB	_____	1.0	_____
Log buffers	4000 KB	_____	1.0	_____
Lock space	5000 KB	_____	0.4	_____
Common storage	2160 KB	_____	0.4	_____
Total real storage size =				_____

2. Plan to add real storage for additional users.

The following table uses rough estimates to approximate the amount of additional real storage that is needed by several kinds of users. If you have more concurrent users, plan to add real storage.

*Table 10. Additional real storage for more users*

Type of user	Additional real storage
Transaction	150 KB
Query	400 KB
Batch	700 KB

**Recommendation:** If you are assessing the storage needs of a running subsystem, look at the Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS report for IFCID 0225. This report calculates the virtual storage per user.

## Example

The following table shows the default real storage size calculations.

*Table 11. Default real storage size calculation*

Category	Default virtual size	× Factor	= Real size
Buffer pools	104,000 KB	1.0	104,000 KB
Sort pool	10,000 KB	0.5	5000 KB
RID pool	400,000	0.5	200,000
EDM pool	33,600 KB	1.0	33,600 KB

Table 11. Default real storage size calculation (continued)

Category	Default virtual size	× Factor	= Real size
Data set size	17,928 KB	0.6	10,756.8 KB
Code size + 1100 (4 address spaces)	40,000 KB	0.5	20,000 KB
Working storage + (DSCF + DDF)	55,800 KB	1.0	55,800 KB
Log buffers	4000 KB	1.0	4000 KB
Lock space	5000 KB	0.4	2000 KB
Common storage	2160 KB	0.4	864 KB
Total real storage size =			436,021 KB

**Related tasks:**

- Calculating buffer pool size
- Calculating EDM pool sizes
- Calculating working storage requirements

## Planning for performance of DB2

When you install or migrate DB2, consider your performance goals for your subsystem or data sharing member. Use z/OS Workload Manager (WLM) to define these goals.


Also, consider the following guidance:



- Monitoring and managing performance are more difficult with few plans.
- Never-ending threads and plans reuse accumulate EDMPOOL storage and working storage.
- Each distributed COMMIT statement needs package accounting.
- Consider reusing threads.
- Finding unused packages and cleaning up mistakes are difficult unless ownership is known.
- Performance monitoring may require analyzing everything in a CICS region instead of just one plan.
- Plan is a required short name.
- Package name is optional, long, multipart, and not always easy to find.
- Consider differentiating by plan within a CICS region and having at least 5 to 20 plans within a region. You can work faster and make changes on a more granular basis.



**Related concepts:**

 [z/OS performance options for DB2 \(DB2 Performance\)](#)

**Related tasks:**

 [Controlling resource usage \(DB2 Performance\)](#)

 [Premigration checklist for migration to DB2 10 conversion mode from DB2 9](#) 

 [Premigration checklist for migration to DB2 10 conversion mode from DB2 9.1](#) 

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## Converting EXPLAIN tables (before migration)

In DB2 10, EXPLAIN tables that are in pre-Version 8 format are no longer supported. EXPLAIN tables that are in Version 8 or Version 9 format and EBCDIC-encoded EXPLAIN tables are deprecated. Before you migrate to Version 10, convert your EXPLAIN tables to Version 8 or DB2 9 format and Unicode encoding.

### About this task

Starting in DB2 10 conversion mode (from both Version 8 and Version 9), DB2 returns SQLCODE -20008 reason code 2 for statements or commands that invoke EXPLAIN processing if EXPLAIN tables are in a pre-Version 8 format. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or Version 9 format. If an EXPLAIN table is in Version 10 format and encoded in EBCDIC, SQLCODE -878 is returned.

Because converting your EXPLAIN tables might be time-consuming, you should complete this task as far before migration as possible.

### Procedure

To convert your EXPLAIN tables before migration:

- If you have a Version 8 subsystem:
  1. Ensure that the subsystem is in Version 8 new-function mode.
  2. Customize and run job DSNTIJPA to identify EXPLAIN tables that need to be removed or converted. Report 14 identifies EBCDIC-encoded EXPLAIN tables. Report 15 identifies EXPLAIN tables that are not in the Version 8 format.
  3. Customize the Version 8 DSNTIJXA job by providing the creator ID of the table or tables to migrate to the Version 8 format, a DB2 subsystem name, and an authorization ID. To migrate all EXPLAIN tables, specify an asterisk as the creator ID.
  4. Run the Version 8 DSNTIJXA job. Job DSNTIJXA calls REXX exec DSNTXTA, which migrates to the Version 8 format all EXPLAIN tables or EXPLAIN tables that belong to the specified creator ID.
  5. Migrate all EBCDIC-encoded EXPLAIN tables to Unicode by completing the following steps:
    - a. Customize the Version 8 DSNTIJXB job with the following values:
      - A DB2 subsystem name
      - An authorization ID
      - The schema name of the EXPLAIN tables to convert
      - The name of the target database
      - The name of the target 4 KB page table space
      - The name of the target 8 KB page table space
      - The name of the target 16 KB page table space
      - The name of the target 8 KB page LOB table space
      - The name of the target 32 KB page LOB table space
    - b. Run the Version 8 DSNTIJXB job. Job DSNTIJXB calls REXX exec DSNTXTB, which generates DB2 cross-loader control statements and equivalent SQL statements that can be used to copy all EBCDIC

- EXPLAIN tables under a specified creator ID to Unicode equivalents. All EXPLAIN tables that belong to the specified creator ID must be in the current release format.
- c. If you have purchased the DB2 Utilities Suite, run the Version 8 DSNTIJXC job to process the control statements that were generated by DSNTIJXB. Otherwise, use the equivalent SQL statements that were generated by DSNTIJXB to convert the tables to Unicode.
  - d. After you convert an EXPLAIN table from EBCDIC encoding to Unicode encoding, check for joins to that table. When you convert EXPLAIN tables to Unicode, applications that join with EXPLAIN tables might have different results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide)
  - e. Repeat steps a through d for each creator that has at least one EBCDIC EXPLAIN table.
- If you have a DB2 9 subsystem:
    1. Ensure that the subsystem is in Version 9 new-function mode.
    2. Customize and run job DSNTIIPA to identify EXPLAIN tables that need to be removed or converted. Report 14 identifies EBCDIC-encoded EXPLAIN tables. Report 15 identifies EXPLAIN tables that are not in the Version 9 format.
    3. Customize the Version 9 DSNTIJXA job by providing the creator ID of the table or tables to migrate to the Version 9 format, a DB2 subsystem name, and an authorization ID. To migrate all EXPLAIN tables, specify an asterisk as the creator ID.
    4. Run the Version 9 DSNTIJXA job. Job DSNTIJXA calls REXX exec DSNTXTA, which migrates to the Version 9 format all EXPLAIN tables or EXPLAIN tables that belong to the specified creator ID.
    5. Migrate all EBCDIC-encoded EXPLAIN tables to Unicode by completing the following steps:
      - a. Customize the Version 9 DSNTIJXB job with the following values:
        - A DB2 subsystem name
        - An authorization ID
        - The schema name of the EXPLAIN tables to convert
        - The name of the target database
        - The name of the target 4 KB page table space
        - The name of the target 8 KB page table space
        - The name of the target 16 KB page table space
        - The name of the target 8 KB page LOB table space
        - The name of the target 32 KB page LOB table space
      - b. Run the Version 9 DSNTIJXB job. Job DSNTIJXB calls REXX exec DSNTXTB, which generates DB2 cross-loader control statements and equivalent SQL statements that can be used to copy all EBCDIC EXPLAIN tables under a specified creator ID to Unicode equivalents. All EXPLAIN tables that belong to the specified creator ID must be in the current release format.
      - c. If you have purchased the DB2 Utilities Suite, run the Version 9 DSNTIJXC job to process the control statements that were generated by DSNTIJXB. Otherwise, use the equivalent SQL statements that were generated by DSNTIJXB to convert the tables to Unicode.

- d. After you convert an EXPLAIN table from EBCDIC encoding to Unicode encoding, check for joins to that table. When you convert EXPLAIN tables to Unicode, applications that join with EXPLAIN tables might have different results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide)
- e. Repeat steps a through d for each creator that has at least one EBCDIC EXPLAIN table.

### What to do next

After you migrate to DB2 10, you will need to also convert your EXPLAIN tables to DB2 10 format.

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## Changes that might affect your migration from Version 8

If you are migrating from Version 8, be aware of the changes that might affect your migration.

Proper planning should alleviate any system inconveniences.

### Compatibility mode is now called conversion mode (from Version 8 or Version 9)

In DB2 10, the terms *conversion mode from Version 8* and *conversion mode from Version 9.1* replace the term *compatibility mode*. Also, the terms *conversion mode\* from Version 8* and *conversion mode\* from Version 9.1* replace the term *compatibility mode\**.

### Availability of new functions in conversion mode from Version 8 and new-function mode

In most cases, new functions are available only in new-function mode. However, optimization and virtual storage enhancements also work in conversion mode from Version 8.

The DB2 10 for z/OS information assumes that your DB2 subsystem is running in DB2 10 new-function mode. Generally, new functions that are described, including changes to existing functions, statements, and limits, are available only in new-function mode. The exceptions to this general statement are new and changed optimization enhancements, which are also available in conversion mode from Version 8 unless stated otherwise. Also, the convergence of the temporary database into the work file temporary database applies to conversion mode from Version 8.

If you migrate from Version 8, you cannot use DB2 9 new-function mode functions in DB2 10 conversion mode from Version 8. You can use those functions in DB2 10 new-function mode. Any functions that are available in conversion mode from Version 8 are also available in all other modes before new-function mode.

### Application and SQL release incompatibilities for migration from Version 8

When you migrate from DB2 Version 8 to DB2 10, be aware of the application and SQL release incompatibilities.



Plan for the following changes in DB2 9 and DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### **Changes in BIND PACKAGE and BIND PLAN defaults (change introduced in DB2 9)**

In DB2 9, the default value for bind option CURRENTDATA is changed from YES to NO. This applies to the BIND PLAN and the BIND PACKAGE subcommands, the CREATE TRIGGER SQL statements for trigger packages, and the CREATE PROCEDURE and the ALTER PROCEDURE ADD VERSION SQL statements for SQL PL procedure packages. Specifying NO for CURRENTDATA is the best option for performance.

The default value for bind option ISOLATION is changed from RR to CS. This applies to the BIND PLAN and the remote BIND PACKAGE subcommands. For the BIND PACKAGE subcommand, the current default (plan value) stays. The default change does not apply to implicitly built CTs (for example, DISTSERV CTs).

If DBPROTOCOL(PRIVATE) is specified, the DB2 10 BIND or REBIND command parser issues error message DSNT225I and fails the BIND or REBIND request to prevent any outbound private protocol communications as a requester. DSNT225I indicates that DBPROTOCOL(PRIVATE) is no longer a supported bind option.

All BIND statements for plans and packages that are bound during the installation or migration process specify the ISOLATION parameter explicitly, except for routines that do not fetch data. The current settings are maintained for compatibility.

### **Plan for the XML data type (change introduced in DB2 9)**

Drop any user-defined data types with the name "XML" to prevent problems with the new DB2 9 built-in XML data type. You can re-create the existing user-defined data types with new names.

### **Changes to XMLNAMESPACES (change introduced in DB2 9)**

In DB2 Version 8, in the XMLNAMESPACES function, if the XML-namespace-uri argument has a value of <http://www.w3.org/XML/1998/namespace> or <http://www.w3.org/2000/xmlns/>, no error is issued. Starting in DB2 9 conversion mode, DB2 issues an error.

### **Changes to serialization of empty elements (change introduced in DB2 9)**

DB2 Version 8, serializes empty XML elements in a different way than in DB2 10. In DB2 Version 8, empty element "a" is serialized as `<a></a>`. Starting in DB2 9 conversion mode, empty element "a" is serialized as `<a/>`.

### **Availability of LOB or XML values in JDBC or SQLJ applications with progressive streaming (change introduced in DB2 9)**

In previous releases, if a JDBC or SQLJ application retrieves LOB data into an application variable, the contents of the application variable are still available after the cursor is moved or closed. DB2 9 supports streaming. The IBM Data Server Driver for JDBC and SQLJ uses progressive streaming as the default for retrieval of



LOB or XML values. When progressive streaming is in effect, the contents of LOB or XML variables are no longer available after the cursor is moved or closed.

### **Adjust applications that depend on error information that is returned from DB2-supplied stored procedures (change introduced in DB2 9)**

Adjust any applications that call one of the following stored procedures and then check and process the specific SQLCODE or SQLSTATE that is returned by the CALL statement:

- SQLJ.INSTALL\_JAR
- SQLJ.REMOVE\_JAR
- SQLJ.REPLACE\_JAR
- SQLJ.DB2\_INSTALL\_JAR
- SQLJ.DB2\_REPLACE\_JAR
- SQLJ.DB2\_REMOVE\_JAR
- SQLJ.DB2\_UPDATEJARINFO

Starting in DB2 9, these stored procedures return more meaningful SQLCODEs and SQLSTATEs than they return in previous releases of DB2. The other input and output parameters of these stored procedures have not changed.

For example, the following application needs to change because -20201 is no longer the SQLCODE that is returned. Successful execution (SQLCODE 0) is not affected.

```
CALL SQLJ.REMOVE_JAR(...)  
IF (SQLCODE = -20201) THEN  
DO;  
...  
END;
```

### **Some materialized query tables should be dropped (change introduced in DB2 9)**

Before migrating to conversion mode from Version 8, drop all materialized query tables that are based on the SYSIBM.SYSROUTINES catalog table. During migration to conversion mode from Version 8, if any materialized query tables are based on the SYSIBM.SYSROUTINES catalog table, SQLCODE -750 is issued.

Before migrating to enabling-new-function mode from Version 8, drop all materialized query tables that are based on the SYSIBM.SYSPACKSTMT catalog table. During migration to enabling-new-function mode from Version 8, if any materialized query tables are based on the SYSIBM.SYSPACKSTMT catalog table, SQLCODE -750 is issued.

### **Fully define objects (change introduced in DB2 9)**

Ensure that you do not have any incomplete object definitions in your DB2 Version 8 catalog. For example, if a table has a primary or unique key defined but the enforcing primary or unique key index does not exist, the table definition is considered incomplete. You need to complete or drop all such objects before you begin migration because their behavior is different in DB2 10. For example, if you attempt to create an enforcing primary key index to complete a table definition in DB2 10 and the residing table space is implicitly created, the index is treated as a regular index instead of an enforcing index.

### **Changes to PL/I applications with no DECLARE VARIABLE statements(change introduced in DB2 9)**

For PL/I applications with no DECLARE VARIABLE statements, the rules for host variables and string constants in the FROM clause of a PREPARE or EXECUTE IMMEDIATE statement have changed. A host variable must be a varying-length string variable that is preceded by a colon. A PL/I string cannot be preceded by a colon.

### **Automatic rebind of plans and packages created before Version 6**

If you have plans and packages that were bound before Version 6 and you specified YES or COEXIST in the AUTO BIND field of panel DSNTIPO, DB2 10 automatically binds these packages. Thus, you might experience an execution delay the first time that such a plan is loaded. Also, DB2 might change the access path due to the autobind, potentially resulting in a more efficient access path.

If you specify NO in the AUTO BIND field of panel DSNTIPO, DB2 10 returns SQLCODE -908, SQLSTATE 23510 for each attempt to use such a package or plan until it is rebound.

### **IBMREQD is no longer reliable as a release dependency mark**

The IBMREQD field in DB2 catalog tables is no longer a reliable indicator for determining release dependencies. Use the RELCREATED or RELBOUND fields instead.

### **Changed behavior for ODBC data conversion for the SQL\_BINARY type(change introduced in DB2 9)**

In releases before DB2 9, when ODBC applications used the SQL\_BINARY type to bind parameter markers, ODBC mapped the SQL\_BINARY type to CHAR FOR BIT DATA. In DB2 10, when the DB2 server is in DB2 10 new-function mode, ODBC maps SQL\_BINARY to BINARY. Because CHAR FOR BIT DATA fields are padded with blanks, and BINARY fields are not padded, applications might experience differences in behavior.

For example, in releases before DB2 9, if the target CHAR FOR BIT DATA column was shorter than the SQL\_BINARY input host variable, and the truncated values were blanks, DB2 did not generate an error. In DB2 10, if the target BINARY column is shorter than the SQL\_BINARY input host variable, and the truncated values are hexadecimal zeroes, DB2 generates an error.

### **Changed behavior of the INSERT statement with the OVERRIDING USER VALUE clause (change introduced in DB2 9)**

When the INSERT statement is specified with the OVERRIDING USER VALUE clause, the value for the insert operation is ignored for columns that are defined with the GENERATED BY DEFAULT or GENERATED ALWAYS attribute.

### **DESCRIBE no longer returns LONG type values (change introduced in DB2 9)**

Because DB2 no longer stores LONG type values in the catalog, when you execute a DESCRIBE statement against a column with a LONG VARCHAR or LONG VARGRAPHIC data type, the DESCRIBE statement returns the values as VARCHAR or VARGRAPHIC data types.

## **DB2 enforces the restrictions about where a host variable array can be specified (change introduced in DB2 9)**

*host-variable-array* is the meta-variable for host variable arrays in syntax diagrams. *host-variable-array* is included only in the syntax for multi-row FETCH, multi-row INSERT, multi-row MERGE, and EXECUTE in support of a dynamic multi-row INSERT or MERGE statement. *host-variable-array* is not included in the syntax diagram for *expression*, so a host variable array cannot be used in other contexts. In previous releases, if you specified *host-variable-array* in an unsupported context, you received no errors. In DB2 10, if a host variable array is referenced in an unsupported context, DB2 issues an error.

For more information about where you can specify the *host-variable-array* variable, see Using host variable arrays in SQL statements (DB2 Application programming and SQL).

## **DEBUGSESSION system privilege required for continued debugging of SQL procedures (change introduced in DB2 9)**

After you migrate to new-function mode, users that debug external SQL procedures need the DEBUGSESSION system privilege. (External SQL procedures were previously called SQL procedures in DB2 Version 8.) Only users of the new Unified Debugger enabled client platforms need this system privilege. Users of the DB2 Version 8 SQL Debugger-enabled client platforms do not need this system privilege.

## **Changes to the result length of the DECRYPT function (change introduced in DB2 9)**

The result length of the DECRYPT function is shortened to 8 bytes less than the length of the input value. If the result expands because of a difference between input and result CCSIDs, you must cast the encrypted data to a larger VARCHAR value before the DECRYPT function is run.

## **Changes to the result length and data type of some functions (change introduced in DB2 9)**

For the following built-in functions, if all parameters have data type DECFLOAT(*n*), the result has data type DECFLOAT(34):

- AVG
- STDDEV
- STDDEV\_SAMP
- SUM
- VARIANCE
- VARIANCE\_SAMP

For the following built-in functions, if the input is all integer or decimal values, or is a mixture of float or double values with integer or decimal values, the result data type is DOUBLE:

- CORRELATION
- COVARIANCE
- COVARIANCE\_SAMP

## **COLTYPE column in SYSIBM.SYSCOLUMNS and SYSIBM.SYSCOLUMNS\_HIST for LONG column types (change introduced in DB2 9)**

When new tables are created with LONG VARCHAR or LONG VARGRAPHIC columns, the COLTYPE values in SYSIBM.SYSCOLUMNS and SYSIBM.SYSCOLUMNS\_HIST contain VARCHAR or VARG.

|  
| **CREATEDBY column in SYSIBM.SYSDATATYPES,**  
| **SYSIBM.SYSROUTINES, SYSIBM.SYSSEQUENCES, and**  
| **SYSIBM.SYSTRIGGERS (change introduced in DB2 9 )**

| The CREATEDBY column might contain a different value than in previous releases  
| of DB2. The column might contain a different value in static CREATE statements  
| for distinct types, functions, and procedures or when a dynamic SQL statement  
| sets the CURRENT SQLID value to a value other than USER.

|  
| **DB2 returns all DSNWZP output in the same format as DB2**  
| **parameters (change introduced in DB2 9)**

| In previous releases, DSNWZP returned the current setting of several system  
| parameters in a format other than the one used by the system parameter macros.  
| For example, DSN6SPRM expected the setting for EDMPOOL in kilobytes, and  
| DSNWZP returned it in bytes. In DB2 10, DB2 returns all DSNWZP output in the  
| same format as DB2 parameters. Modify programs that call DSNWZP if they  
| compensate for the format differences.

|  
| **DB2 enforces the restriction that row IDs are not compatible with**  
| **character strings when they are used with a set operator (change**  
| **introduced in DB2 9 )**

| In previous releases, DB2 did not always enforce the restriction that row IDs are  
| not compatible with character strings. In DB2 10, DB2 enforces the restriction that  
| row IDs are not compatible with string types when they are used with a set  
| operator (UNION, INTERSECT, or EXCEPT).

|  
| **Database privileges on the DSNDB04 database now give you**  
| **those privileges on all implicitly created databases (change**  
| **introduced in DB2 9 )**

| Because database privileges on the DSNDB04 database now give you those  
| privileges on all implicitly created databases, careful consideration is needed before  
| you grant database privileges on DSNDB04. For example, in DB2 10, if you have  
| the STOPDB privilege on DSNDB04, you also have the STOPDB privilege on all  
| implicitly created databases.

|  
| **Implicitly created objects that are associated with LOB columns**  
| **require additional privileges (change introduced in DB2 9 )**

| In releases before DB2 9 , implicitly created objects that are associated with LOB  
| columns do not require CREATETAB and CREATETS privileges on the database of  
| the base table. Those implicitly created objects also do not require the USE  
| privilege on the buffer pool and storage group that is used by the LOB objects. In  
| DB2 10, these privileges are required.

|  
| **Adjust applications to use LRHCLR instead of LGDISCLR**  
| **(change introduced in DB2 9)**

| The LGDISCLR field in the DSNDQJ00 macro has been removed. Update  
| applications that use the LGDISCLR value in the DSNDQJ00 mapping macro to  
| determine whether a log record is a compensation log record to use the LRHCLR  
| value instead.

|  
| **Changed behavior for the CREATE statement (change introduced**  
| **in DB2 9 )**

| You can no longer create databases with the AS TEMP clause or table spaces that  
| specify TEMP as the target database. The TEMP database is no longer used by  
| DB2. The WORKFILE database is the only temporary database.

## **The DECLARE statement and the work file database (change introduced in DB2 9)**

If you have applications in DB2 Version 8 that issue DECLARE SENSITIVE STATIC SCROLL CURSOR or DECLARE GLOBAL TEMPORARY TABLE statements, ensure that the work file database exists and that it has at least one table space with a 32 KB page size to avoid errors.

## **Adjust monitor programs that access OP buffers (change introduced in DB2 9)**

Adjust assignment strategies of monitor programs that access OP buffers. In DB2 Version 8, traces are left in a disabled state, which consumes CPU for trace data that cannot be retrieved. In DB2 10, traces that are started with a destination of OPX choose the next available buffer that is not in use and traces are no longer left in a disabled state.

In addition, in DB2 Version 8, when the thread that owns an OP buffer terminates, OP traces are left in a disabled state and can be reactivated by starting another trace to that buffer. In DB2 10, if an OP buffer terminates and the only destinations for the trace records are OP buffers, the traces that are started to that buffer are stopped. If an OP buffer terminates and the trace is started to both OP and non-OP destinations, the traces that are started to that buffer are modified to use non-OP destinations only.

The message format of DSNW128I and DSNW129I has changed, so modify automation that is based on those message formats.

## **Changed behavior for system-required objects (change introduced in DB2 9)**

After you migrate to DB2 10 new-function mode, if the containing table space is implicitly created, you cannot drop any system-required objects, except for the LOB table space. This restriction applies even if you explicitly created these objects in a previous release. The following statements will not work properly if the system-required objects were implicitly created by DB2:

### **CREATE AUXILIARY TABLE**

If you issue a CREATE AUXILIARY TABLE statement and an auxiliary table that was implicitly created by DB2 already exists for the same base table, the CREATE AUXILIARY TABLE statement fails and DB2 issues SQLCODE -646, SQLSTATE 55017, and reason code 3.

### **CREATE LOB TABLESPACE**

If you issue a CREATE LOB TABLESPACE statement to create a LOB table space in an implicitly created database, the CREATE LOB TABLESPACE statement fails and DB2 issues SQLCODE -20355, SQLSTATE 429BW, and reason code 1.

### **CREATE DATABASE**

If you specify an eight-character database name that begins with DSN and is followed by exactly five digits in a CREATE DATABASE statement, the CREATE DATABASE statement fails and DB2 issues SQLCODE -20074, SQLSTATE 42939.

### **CREATE INDEX**

If you create an index on a primary key, unique key, or ROWID column that is defined as GENERATED BY DEFAULT, the index will be treated as a regular index instead of an enforcing index.

### **CREATE AUXILIARY INDEX**

If you issue a CREATE AUXILIARY INDEX statement and an auxiliary index that was implicitly created by DB2 already exists for the same base table, the CREATE AUXILIARY INDEX statement fails and DB2 issues SQLCODE -748, SQLCODE 54048, and reason code 3.

### **CREATE**

If you issue a CREATE statement and do not specify an IN clause or table space name, and the default buffer pool is not large enough, DB2 chooses a 4 KB, 8 KB, 16 KB, or 32 KB buffer pool, depending on the record size. If you issue a CREATE statement and do not specify an IN clause or table space name, DB2 implicitly creates a partitioned-by-growth universal table space. If you drop the table, DB2 also drops the containing table space.

### **DROP TABLE**

If you issue a DROP TABLE statement to drop an auxiliary table from a table space that was implicitly created by DB2, the DROP TABLE statement fails and DB2 issues SQLCODE -20355, SQLSTATE 429BW, and reason code 2.

### **DROP TABLESPACE**

If you issue a DROP TABLESPACE statement to drop an implicitly created LOB table space, the DROP TABLESPACE statement fails and DB2 issues SQLCODE -20355, SQLSTATE 429BW, and reason code 2.

### **DROP INDEX**

If you issue a DROP INDEX statement to drop an enforcing primary key, unique key, or ROWID index from a table space that was implicitly created, the DROP INDEX statement fails and DB2 issues SQLCODE -669, SQLSTATE 42917, and reason code 2. If you issue a DROP INDEX statement to drop an auxiliary index from a table space that was implicitly created, the DROP INDEX statement fails and DB2 issues SQLCODE -20355, SQLSTATE 429BW, and reason code 2.

### **Changes to INSERT, UPDATE, or DELETE statements on some indexes(change introduced in DB2 9)**

In DB2 10, you cannot execute INSERT, UPDATE, or DELETE statements that affect an index in the same commit scope as ALTER INDEX statements on that index.

### **LOBs with a maximum length greater than 1 GB can now be logged(change introduced in DB2 9)**

In releases before DB2 9 , only LOBs with a maximum length of 1 GB or less could be logged. In DB2 10, LOBs with a maximum length that is greater than 1 GB can be logged.

### **DB2 returns an error when a LOB value is specified for an argument to a stored procedure and the argument value is longer than the target parameter and the excess is not trailing blanks (change introduced in DB2 9 )**

In releases before DB2 9 , DB2 did not return an error when a LOB value was specified for an argument to a stored procedure and the argument value was longer than the target parameter and the excess was not trailing blanks. DB2 truncated the data and the procedure executed. In DB2 10, DB2 returns an error.

## Changes to string formatting of decimal data

### Explanation

DB2 10 changed the formatting of decimal data by the CHAR and VARCHAR built-in functions and CAST specifications with a CHAR or VARCHAR result type. For input data that contains decimals, leading zeros are removed, and leading zeros are not added to values that did not already contain leading zeros. If the scale of the decimal value is zero, the decimal character is not returned. Also, the CHAR function no longer returns leading blanks for positive decimal values. The result of the CHAR function for decimal data is now consistent with the result of `CAST(decimal-expression AS CHAR)`.

After migration to DB2 10, packages that were bound before DB2 10 use the old behavior for these functions. Materialized query tables and indexes on expressions that were created before DB2 10 also continue to use the old behavior.

Views and inline SQL functions use the behavior of the SQL statement that references the object. It is possible for references to the same view or function in different applications to get different behavior for these functions or casts.

### Possible impact to your DB2 environment

These changes might cause unexpected output from applications that use the CHAR or VARCHAR functions for decimal data or the `CAST(decimal-expression AS CHAR)` or `CAST(decimal-expression AS VARCHAR)` specifications.

### Actions to take

These changes occur in DB2 10 conversion mode (from both Version 8 and Version 9). You can temporarily override these changes on a subsystem level by using the BIF\_COMPATIBILITY subsystem parameter. You can also temporarily override these changes on an application level by adding schema SYSCOMPAT\_V9 to the front of the PATH bind option or CURRENT PATH special register. This approach works for CHAR and VARCHAR functions and does not affect CAST specifications. The recommended approach is to modify your applications to handle the DB2 10 behavior for these functions, as described in the following steps.

To modify your applications to handle the DB2 10 behavior for CHAR, VARCHAR, and CAST:

1. Identify applications that need to be modified to handle this change. You can use IFCID trace 0366 to identify affected applications.
2. Ensure that the BIF\_COMPATIBILITY subsystem parameter is set to V9\_DECIMAL\_VARCHAR.

To handle the change for the CHAR function only, you can set the subsystem parameter to V9 and complete the following steps for the CHAR function.

3. Change any affected applications to handle the new DB2 10 CHAR and VARCHAR behavior, including stored procedures, non-inline user-defined functions, and trigger packages. Rewrite affected CAST specifications with the appropriate CHAR or VARCHAR function and a CAST to the correct length if needed.
4. Rebind and prepare packages with the `PATH(SYSCURRENT,SYSIBM)` rebind option to use the new DB2 10 CHAR and VARCHAR built-in functions. Repeat this step for native stored procedures (SQLPL) and non-inline SQL scalar functions.

5. For views that reference these casts or built-in functions, determine whether the view needs to be changed to have the expected output. Drop and re-create the views with the PATH(SYSCURRENT, SYSIBM) rebind option only if necessary. Rebind any applications that reference the views with the PATH(SYSCURRENT, SYSIBM) option to use the new DB2 10 CHAR and VARCHAR built-in functions. Repeat this step for inline SQL scalar functions.
6. For materialized query tables or indexes on expressions that reference these casts or built-in functions, drop and re-create the materialized query tables or indexes on expressions with the PATH(SYSCURRENT, SYSIBM) rebind option. Issue the REFRESH TABLE statement for materialized query tables. Rebind any applications that reference the materialized query tables or indexes on expressions with the PATH(SYSCURRENT, SYSIBM) option to use the new DB2 10 CHAR and VARCHAR built-in functions.
7. Change the value of the BIF\_COMPATIBILITY subsystem parameter to CURRENT. When the subsystem parameter value is CURRENT, new applications, rebinds, and CREATE statements use the new CHAR, VARCHAR, and CAST behavior.

Materialized query tables and indexes on expressions use the CHAR, VARCHAR, and CAST behavior that is specified during its creation. If a reference statement has a different behavior that is specified by the BIF\_COMPATIBILITY parameter or a different path, the materialized query table or expression-based index is not used.

**Related reference:**

“BIF\_COMPATIBILITY field (BIF\_COMPATIBILITY subsystem parameter)” on page 454

**Change to maximum result length of VARCHAR function**

In DB2 10, the maximum result length of the VARCHAR function is changed from 32767 to the maximum length of a VARCHAR.

**Leading or trailing blanks from the VARCHAR\_FORMAT function format string are no longer removed (change introduced in DB2 9)**

Leading or trailing blanks from the format string for the VARCHAR\_FORMAT function are no longer removed. Existing view definitions are recalculated as part of DB2 10, so the new rules take effect. You can continue to use existing SQL statements that use a materialized query table that references the VARCHAR\_FORMAT function, but they use the old rules and remove leading and trailing blanks. Existing references to the VARCHAR\_FORMAT function in bound statements only get the new behavior when they have been bound or rebound in DB2 10.

**Changes to VARCHAR\_FORMAT function length attribute**

In DB2 10, for VARCHAR\_FORMAT functions, the length attribute of the result is the length attribute of the format string, up to a maximum of 255. To apply this change, use the following guidance:

- Existing view definitions that reference the VARCHAR\_FORMAT function should be regenerated with an ALTER VIEW statement.
- Existing materialized query statements that reference the VARCHAR\_FORMAT function should be dropped and re-created.
- Bound SQL statements that reference the VARCHAR\_FORMAT function will only use the new behavior when they have been bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.



- DESCRIBE statements will only determine the result data type for the VARCHAR\_FORMAT function using the modified rules in the DESCRIBE statements have been bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- Existing indexes that involve an expression that reference the VARCHAR\_FORMAT function should be dropped and re-created.

If an application is using the DSNTIAUL program, the result string is padded with characters '00'X. Consider this incompatible change for any applications that use the VARCHAR\_FORMAT function and are dependent on the output from DSNTIAUL.

### **New format element for VARCHAR\_FORMAT function**

In DB2 10, a new format element, “RRRR”, is supported. In previous versions, this format element was interpreted as two adjacent specifications of the “RR” format element.

### **Change to result of VARCHAR\_FORMAT function with “HH12” format element**

In DB2 10, if the “HH12” format element is specified in a VARCHAR\_FORMAT function and the time component of the first argument is 24:00:00, the input timestamp value is adjusted to 00:00:00 and the date is changed to the next day. In previous releases, the timestamp value is adjusted to 12:00:00 and the day is not changed.

### **Change to result of VARCHAR\_FORMAT function with “J” format element**

In DB2 10, if the “J” format element is specified in a VARCHAR\_FORMAT function, the result is different from the result of the JULIAN\_DAY function for dates earlier than October 15, 1582.

### **New supported data types for VARCHAR\_FORMAT function**

The VARCHAR\_FORMAT function has been extended to allow date, character, and graphic string input for the first argument, and graphic string input for the second argument. If the function is invoked with one of the newly supported data types, and an existing user-defined function named VARCHAR\_FORMAT also supports the data type, the function might resolve to the built-in function rather than the user-defined function. If the reference to the existing function uses the unqualified name and SYSIBM precedes the schema that was used for the user-defined function, the new function will be invoked rather than the user-defined function.

### **Change to maximum result length of REPEAT function**

In DB2 10, the maximum result length of the REPEAT function is changed from 32767 to the maximum length of a VARCHAR.

### **Change to maximum result length of XMLTABLE function**

In DB2 10, the maximum length of a VARCHAR data type result column of the XMLTABLE function is changed from 32767 to the maximum length of a VARCHAR.

### **DB2 drops certain indexes when a unique constraint is dropped (change introduced in DB2 9 )**

In releases before DB2 9 , if a unique constraint was dropped, DB2 did not drop the index that enforced uniqueness. Starting in DB2 9, if a table is in an implicitly created table space, and a unique constraint on that table is dropped, DB2 drops the index that enforces uniqueness.

|  
| **DB2 enforces restriction on specifying a CAST FROM clause for  
| some forms of CREATE FUNCTION statements(change  
| introduced in Version 9.1)**

| The CAST FROM clause is included only in the syntax diagram for the CREATE  
| FUNCTION statement for an external scalar function. The CAST FROM clause is  
| not included in the syntax diagrams for the other variations of CREATE  
| FUNCTION (external table function, sourced function, or SQL function); the clause  
| cannot be used for these other variations. In previous releases, if you specified a  
| CAST FROM clause in an unsupported context, you received no errors. Starting in  
| DB2 9, if a CAST FROM clause is specified in an unsupported context, DB2 issues  
| an error.

|  
| **DB2 enforces restrictions on specifying the AS LOCATOR clause  
| and TABLE LIKE clause (change introduced in DB2 9)**

| The AS LOCATOR clause for LOBs is included in the syntax diagram for the  
| CREATE FUNCTION statement for an SQL function. This clause is not supported  
| in other contexts when identifying an existing SQL function such as in an ALTER,  
| COMMENT, DROP, GRANT, or REVOKE statement. In previous releases, if you  
| specified an AS LOCATOR clause for LOBs in an unsupported context, you might  
| not have received an error. Starting in DB2 9, if an AS LOCATOR clause for LOBs  
| is specified in an unsupported context, DB2 issues an error.

|  
| The TABLE LIKE clause for a trigger transition table is included only in the syntax  
| diagram for the CREATE FUNCTION statement for an external scalar function,  
| external table function, or sourced function. This clause is not supported for SQL  
| functions or in other contexts when identifying an existing function such as in an  
| ALTER, COMMENT, DROP, GRANT, or REVOKE statement, or in the SOURCE  
| clause of a CREATE FUNCTION statement. In previous releases, if you specified a  
| TABLE LIKE clause for a trigger transition table in an unsupported context, you  
| might not have received an error. Starting in DB2 9, if a TABLE LIKE clause for a  
| trigger transition table is specified in an unsupported context, DB2 issues an error.

|  
| **DB2 enforces restriction on the CCSID parameter for the  
| DECRYPT\_BIT and DECRYPT\_BINARY functions (change  
| introduced in DB2 9)**

| The CCSID parameter is not supported by the DECRYPT\_BIT and  
| DECRYPT\_BINARY built-in functions. In previous releases, if you specified an  
| argument for the CCSID parameter for these functions, you received no errors.  
| Starting in DB2 9, if an argument is specified for the CCSID parameter in an  
| unsupported context, DB2 issues an error.

|  
| **Changed behavior of CREATE PROCEDURE for an SQL  
| procedure (change introduced in DB2 9)**

| With the introduction of native SQL procedures in DB2 9, the semantics of the  
| CREATE PROCEDURE statement for an SQL procedure has changed. Starting in  
| DB2 9, all SQL procedures that are created without the FENCED option or the  
| EXTERNAL option in the CREATE PROCEDURE statement are native SQL  
| procedures. In previous releases of DB2, if you did not specify either of these  
| options, the procedures were created as external SQL procedures.

|  
| If you do specify FENCED or EXTERNAL, the meanings are the same as in  
| previous releases of DB2. Both of these keywords mean that an external SQL  
| procedure is to be created.

### **Explicitly qualify names of variables, parameters, and columns in SQL procedures (change introduced in DB2 9 )**

As of DB2 9, the rules that are used for name resolution within a native SQL procedure differ from the rules that were used for SQL procedures in prior releases. Because an SQL parameter or SQL variable can have the same name as a column name, you should explicitly qualify the names of any SQL parameters, SQL variables or columns that have non-unique names. For more information about how the names of these items are resolved, see References to SQL parameters and SQL variables (DB2 SQL). The rules that are used for name resolution within external SQL procedures remain unchanged.

### **Make any necessary program changes for possibly different values for RETURNED\_SQLSTATE and DB2\_RETURNED\_SQLCODE (change introduced in DB2 9 )**

Starting in DB2 9, when an SQL statement other than GET DIAGNOSTICS or compound-statement is processed, the current diagnostics area is cleared before DB2 processes the SQL statement. Clearing of the diagnostics area can result in different values being returned for RETURNED\_SQLSTATE and DB2\_RETURNED\_SQLCODE for a GET DIAGNOSTICS statement than what would be returned if the GET DIAGNOSTICS statement were issued from within an external SQL procedure. Additionally, there might be some differences in the values returned for the SQLSTATE and SQLCODE SQL variables than would have been returned from an external SQL procedure. (External SQL procedures were previously called SQL procedures in Version 8.)

### **SQLSTATE and SQLCODE SQL variables after a GET DIAGNOSTICS statement (change introduced in Version 9.1)**

Starting in DB2 9, the SQLSTATE and SQLCODE SQL variables are not cleared following a GET DIAGNOSTICS statement.

### **Coding multiple SQL statements in a handler body (change introduced in DB2 9)**

Previous releases of DB2 did not allow for a compound statement within a handler. A workaround to include multiple statements within a handler (without support for a compound statement in a handler) was to use another control statement, such as an IF statement, which in turn contained multiple statements. Starting in DB2 9, DB2 supports a compound statement within a handler body. The compound statement is recommended for including multiple statements within a handler body.

### **Unhandled warnings (change introduced in DB2 9 )**

Starting in DB2 9, when a native SQL procedure completes processing with an unhandled warning, DB2 returns the unhandled warning to the calling application. The behavior of an external SQL procedure is unchanged from releases prior to DB2 9. When such a procedure completes processing with an unhandled warning, DB2 does not return the unhandled warning to the calling application.

### **Change your programs to handle any changed messages from SQL procedures (change introduced in Version 9.1)**

Starting in DB2 9, DB2 issues different messages for the new native SQL procedures than it does for external SQL procedures. (External SQL procedures were previously called SQL procedures in Version 8.) For external SQL procedures, DB2 continues to issue DSNHxxxx messages. For native SQL procedures, DB2 issues SQL return codes. The relationship between these messages is shown in the following table:

Table 12. Relationship between DSNHxxxx messages that are issued for external SQL procedures and SQLCODEs that are issued for native SQL procedures

DSNHxxxx message <sup>1</sup>	SQLCODE <sup>2</sup>
DSNH051I	-051
DSNH385I	+385
DSNH590I	-590
DSNH4408I	-408
DSNH4777I	n/a
DSNH4778I	-778
DSNH4779I	-779
DSNH4780I	-780
DSNH4781I	-781
DSNH4782I	-782
DSNH4785I	-785
DSNH4787I	-787

**Note:**

1. These messages are used for external SQL procedures, which can be defined by specifying EXTERNAL or FENCED in DB2 10.
2. These messages are used for native SQL procedures in DB2 10.

**Enhanced data type checking for zero-length characters (change introduced in DB2 9)**

Starting in DB2 9, when you specify a CHAR data type with a length of 0 in the SQLDA, DB2 issues SQLCODE -804 regardless of the null indicator value.

**Adding a column generates a new table space version (change introduced in DB2 9)**

In previous releases, adding a column to a table did not generate a new table space version. Starting in DB2 9, adding a column to a table with an ALTER TABLE ADD COLUMN statement generates a new table space version.

**You cannot add a column and issue SELECT, INSERT, UPDATE, or DELETE statements in the same commit scope**

You cannot have a version-generating ALTER TABLE ADD COLUMN statement and SELECT, INSERT, UPDATE, or DELETE statements in the same commit scope. If a version-generating ALTER TABLE ADD COLUMN statement follows SELECT, INSERT, UPDATE, or DELETE statements in the same commit scope, SQLCODE -910 is issued. SQLCODE -910 is also issued if SELECT, INSERT, UPDATE, or DELETE statements follow a version-generating ALTER TABLE ADD COLUMN statement in the same commit scope.

**CAST FROM clause of CREATE FUNCTION statement for SQL functions is no longer supported (change introduced in DB2 9)**

The CAST FROM clause of the CREATE FUNCTION statement for SQL functions is no longer supported. Starting in DB2 9, if you issue a CREATE FUNCTION statement for an SQL function with a CAST FROM clause, DB2 issues an error.

## Specifying ALTER DATABASE STOGROUP for work file databases (change introduced in DB2 9)

In previous releases of DB2, you could not execute ALTER DATABASE STOGROUP on a work file database. Beginning with DB2 9 conversion mode, this restriction is removed.

## DB2 enforces restrictions about where an INTO clause can be specified (change introduced in DB2 9)

The INTO clause (as related to queries) is included only in the syntax diagram for the SELECT INTO statement. The INTO clause is not included in the syntax diagrams for select-clause, subselect, fullselect, or select-statement. In previous releases, if you specified an INTO clause in an unsupported context in a query, you might not have received an error. Starting in DB2 9, if an INTO clause is specified in an unsupported context, DB2 issues an error.

## Change to how a positive, signed integer in an ORDER BY clause is treated

### Explanation

Beginning in DB2 10 conversion mode (from both Version 8 and Version 9), a positive, signed integer in an ORDER BY clause is treated as a *sort-key-expression*. Such integers were previously interpreted as column numbers.

For example, in previous versions, ORDER BY +1 in the following SELECT statement meant order by column 1 (C1).

```
SELECT C1, C2 FROM T1 ORDER BY +1;
```

Starting in DB2 10, +1 means the constant +1, which has no effect on the order of the rows.

### Possible impact to your DB2 environment

This change might cause unexpected results of queries that contain an ORDER BY clause with a positive, signed integer. However, no error is issued when such queries are run.

### Actions to take

To prepare for this change, identify any queries that use a positive, signed integer in an ORDER BY clause to refer to a column in the result table. Modify these queries to use unsigned integers to identify column numbers.

#### Related reference:

 [order-by-clause \(DB2 SQL\)](#)

## Binding DBRMs directly into plans is no longer supported

For pre-existing plans that are bound from DBRMs, you can use the COLLID parameter of the REBIND PLAN command to create packages. If you execute a plan that is bound from DBRMs, DB2 performs an automatic rebind that creates packages from the DBRMs and binds those packages into a plan. However, it is recommended that you run REBIND PLAN with the COLLID option so that you can specify bind options and receive more diagnostic information.

**Important:** If the same DBRM is in multiple plans, and you run REBIND PLAN with the same COLLID option value on more than one of those plans, DB2 overlays the previously created package in the collection each time you run

REBIND with COLLID. To avoid overlaying packages, specify a different COLLID value for each plan that contains DBRMs that are also in other plans.

If the installation uses the RACF access control module, owners of plans with DBRMs need to explicitly rebind the plans to convert the DBRMs to packages.

For more information on developing a strategy for converting your plans to include only packages, see Conversion to packages (DB2 9 for z/OS: Packages Revisited).

### **Some BIND PLAN and REBIND PLAN command options are no longer supported**

The ACQUIRE(ALLOCATE) option of the BIND PLAN and REBIND PLAN commands is no longer supported. If you specify ACQUIRE(ALLOCATE), DB2 issues a warning message and uses ACQUIRE(USE).

Also, the MEMBER option of BIND PLAN and REBIND PLAN is no longer supported. If you specify MEMBER, DB2 issues a warning message, binds the specified DBRM into a package, and binds the package into a plan.

### **Plans and packages should be converted to DRDA protocol**

Plans and packages that were previously bound using DBPROTOCOL(PRIVATE) should be converted to DRDA protocol before migration to DB2 10. In DB2 10, plans and packages that were bound with the DBPROTOCOL(PRIVATE) bind option and access remote locations cannot run. Applications that use packages or plans that were bound with DBPROTOCOL(PRIVATE) and access remote locations fail with SQLCODE -904. A rebind of those plans and packages must be explicitly performed before they can execute successfully. Job DSNTIJPM identifies the objects that must be converted to use DRDA protocol.

### **Change to GRANT statement**

The PUBLIC AT ALL LOCATIONS clause is no longer allowed in the GRANT statement for table and view privileges as an alternative to PUBLIC. The DSNTPPCK program in Version 8 and DB2 9 analyzes the embedded SQL statements in packages and plans for private protocol SQL, which is invalid in DB2 10. The program produces a report that states which packages and member DBRMs of plans contain the invalid syntax. The program scans either the SYSIBM.SYSSTMT catalog table, the SYSIBM.SYSPACKSTMT catalog table, or both. Applications that issue dynamic SQL statements with the invalid PUBLIC AT ALL LOCATIONS clause will receive SQLCODE -199.

### **Change to IMMEDIATE option of BIND PACKAGE command**

In DB2 10, if IMMEDIATE is not specified on a BIND PACKAGE command, the default is "I", or INHERITFROMPLAN. In previous versions, the default was NO.

### **Changes to conversion of special characters in collection IDs and package names**

In DB2 10, DRDA character type parameter data is sent between client drivers and DB2 in UTF-8 Unicode, if those client drivers also have this support. Character type parameter data includes package names and collection IDs. Prior to DB2 10, collection IDs and package names were sent in EBCDIC, and then converted to Unicode before being stored in the DB2 catalog. A collection ID or package name that is in the DB2 catalog from a bind that was initiated by an older driver might not match an ID or name that is sent to DB2 by a newer driver. This mismatch, which is caused by the way that some special characters are converted, can cause package-not-found errors. Job step DSNTGEN of job DSNTIJPM identifies package

names and collection IDs that contain special characters that cause mismatches. From the upgraded client drivers, those packages need to be bound with the ACTION(REPLACE) option.

### Changes to the RELEASE bind option

In releases prior to DB2 10, the RELEASE bind option had no effect on database access threads. Starting in DB2 10, by default, DB2 honors the RELEASE bind option for database access threads. You can modify this behavior by using the new MODIFY DDF PKGREL command.

### Database metadata stored procedures are converted to Unicode

In DB2 10, supplied database metadata stored procedures are encoded in Unicode. The DB2 10 migration process redefines the stored procedures to use the following new load modules:

Table 13. Metadata stored procedures and associated load modules

Stored procedure	Load module
SYSIBM.SQLCOLPRIVILEGES	DSNACPRU
SYSIBM.SQLCOLUMNS	DSNACOLU
SYSIBM.SQLFOREIGNKEYS	DSNAFNKU
SYSIBM.SQLFUNCTIONCOLS	DSNAFCOU
SYSIBM.SQLFUNCTIONS	DSNAFUNU
SYSIBM.SQLGETTYPEINFO	DSNATYPU
SYSIBM.SQLPRIMARYKEYS	DSNAPRKU
SYSIBM.SQLPROCEDURECOLS	DSNAPCOU
SYSIBM.SQLPROCEDURES	DSNAPRCU
SYSIBM.SQLSPECIALCOLUMNS	DSNASPCU
SYSIBM.SQLSTATISTICS	DSNASTAU
SYSIBM.SQLTABLEPRIVILEGES	DSNATBPU
SYSIBM.SQLTABLES	DSNATBLU
SYSIBM.SQLUDTS	DSNAUDTU

Some applications call the database metadata stored procedures to retrieve double-byte (DBCS) data. Those applications must be modified to use Unicode if they are bound on a DB2 server that has an EBCDIC SBCS CCSID, and the MIXED parameter is set to NO in the application defaults load module, *dsnhdcep*.

### AUTHID is the default owner of packages that are bound by DSNTRIN

In previous releases, the stored procedures and user-defined functions that are provided as part of the DB2 base product (routine that supplied routines) were created and bound by processing inline DDL and bind statements in DSNTIJSG and other installation jobs. By default, the ID that was used to run the job was also the authorization ID for creating the routines and the default package owner for those routines.

In DB2 10, DB2-supplied routines are created and bound by running program DSNTRIN in job DSNTIJRT. The AUTHID parameter of DSNTRIN specifies the authorization ID for creating the routines. This ID is also the default owner of packages that are bound for those routines.

## **New default DEFINE attribute for dependent objects**

As of DB2 10, if the DEFINE attribute is not specified in the CREATE statement for explicitly created dependent objects (auxiliary indexes, XML indexes, and base table indexes), DB2 uses the DEFINE attribute of the base table space.

**Exception:** If the DEFINE attribute is not specified for explicitly created LOB table spaces, there is no correlation with the base table space until the auxiliary table is created. The DEFINE attribute is not inherited from the base, and the default is DEFINE YES.

Implicitly created dependent objects (base table indexes, LOB and XML table spaces, and their dependent indexes) inherit the DEFINE attribute of the base table space if it is DEFINE NO. Otherwise, if the base table space attribute is DEFINE YES, the value of the IMPDSEF subsystem parameter is used for the dependent objects.

## **Change for creating partitioned table spaces**

To create a partitioned (non-universal) table space in DB2 10 new-function mode, you must specify SEGSIZE 0 and the NUMPARTS keyword of the CREATE TABLESPACE statement. Before new-function mode, do not specify the SEGSIZE to create a partitioned table space.

## **Change to default for CREATE TABLESPACE statements**

In previous releases of DB2, if a CREATE TABLESPACE statement contains the NUMPARTS clause but neither the MAXPARTITIONS clause nor the SEGSIZE clause, a partitioned (non-universal) table space is created. Beginning in DB2 10 new-function mode, the same statement results in a range-partitioned table space with a segment size of 32 by default. You might observe this difference when a subsequent CREATE INDEX statement with the specified ranges fails because index partitioning of a range-partitioned table space is not supported.

In response, you can change the default segment size through the DSN6SYSP.DPSEGSZ subsystem parameter, which is externalized as the DEFAULT PARTITION SEGSIZE field on panel DSNTIP7. The value of the DPSEGSZ parameter can range from 0 to 64 in increments of 4; for example, 0, 4, 8, and so on up to 64. The default is 32.

When DPSEGSZ is set to 0, a CREATE TABLESPACE statement that contains the NUMPARTS clause but neither the MAXPARTITIONS clause nor the SEGSIZE clause results in a partitioned (non-universal) table space, which is the behavior of previous releases. Note that the DPSEGSZ parameter is provided for compatibility only. It is deprecated in DB2 10, and you should take steps to modify affected CREATE TABLESPACE statements or plan to use partition-by-growth table spaces instead of partitioned (non-universal) table spaces.

## **Upgrade to supported COBOL and PL/I compilers**

If you use the DB2 10 precompiler, you must upgrade to COBOL compilers that DB2 10 supports. See the DB2 Program Directory for information about supported compilers. The generated SQLCA and SQLDA for COBOL have changed. The generated attribute for binary data items is now COMP-5 instead of COMP-4 or COMP. Applications that are compiled on compilers that do not support the COMP-5 attribute no longer work.

For some COBOL and PL/I compilers that are no longer supported, you can use a version of the precompiler that allows you to precompile applications that have dependencies on these unsupported compilers. You can use this version of the precompiler with the following unsupported compilers:



- OS/VS COBOL V1.2.4
- OS PL/I 1.5 (PL/I Opt. V1.5.1)
- VS/COBOL II V1R4
- OS PL/I 2.3

The load module for this precompiler is DSNHPC7. This precompiler is meant only to ease the transition from unsupported compilers to supported compilers. This precompiler has the following restrictions:

- There is no corresponding DB2 coprocessor function to match this precompiler.
- The precompiler does not support SQL procedures.
- Only COBOL and PL/I are supported.
- The SQL flagger is not supported.
- The precompiler produces DB2 Version 7 DBRMs, and does not support any capability that is newer than DB2 Version 7.
- The application defaults module must be named DSNHDECP.

Support of this precompiler is deprecated in DB2 10.

### **GRAPHIC and NOGRAPHIC SQL processing options are removed**

If you specify the SQL processing options GRAPHIC or NOGRAPHIC, DB2 issues a standard warning message about an invalid option. These options are superseded by the CCSID SQL processing option.

### **SELECT FROM data change statements in BEFORE triggers no longer supported**

The following statements are no longer allowed in the body of a BEFORE trigger:

- SELECT FROM DELETE
- SELECT FROM INSERT
- SELECT FROM MERGE
- SELECT FROM UPDATE

### **RETURN statement in scalar functions must follow *option-list***

In previous DB2 versions, RETURN statements in scalar functions could be in any order, relative to other clauses. After migration to DB2 10 conversion mode (from Version 8 or Version 9), the RETURN statement in CREATE FUNCTION or ALTER FUNCTION statements must follow *option-list*. If a RETURN statement precedes *option-list* in one of these statements, DB2 issues SQLCODE -199.

### **Changes to ROUND\_TIMESTAMP and TRUNC\_TIMESTAMP functions**

In DB2 10, the ROUND\_TIMESTAMP and TRUNC\_TIMESTAMP functions return the first day of the first ISO week of the ISO year when an ISO year format is specified.

Also, whenever a CC or SCC format is specified, a start of a century is considered to be year 01.

### **Changes to result of NEXT\_DAY function**

In DB2 10, the result data type for the NEXT\_DAY function is determined from the input data. If the first input argument is a string, the result is TIMESTAMP(6) WITHOUT TIME ZONE. Otherwise, the data type of the result is the same as the

data type of the first input argument. For example, if the input is a date data type, the result is also a date data type. The following rules apply to the change in the NEXT\_DAY function:

- Existing view definitions that reference the NEXT\_DAY function should be regenerated with an ALTER VIEW statement.
- Existing materialized query statements that reference the NEXT\_DAY function should be dropped and re-created.
- Bound SQL statements that reference the NEXT\_DAY function only use the modified rules to determine the result data type if the statements are bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- DESCRIBE statements only use the modified rules to determine the result data type for the NEXT\_DAY function if the statements are bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- Existing indexes that involve an expression that reference the NEXT\_DAY function should be dropped and re-created.

### **Changes to MONTHS\_BETWEEN function**

In previous releases, the MONTHS\_BETWEEN function ignored the time portion of arguments. In DB2 10, the MONTHS\_BETWEEN function takes the time portion of arguments into consideration.

### **Changes to TIMESTAMPDIFF function**

In previous releases, the TIMESTAMPDIFF function allowed string input values that had more than six digits to the right of the decimal point. In DB2 10, an error is issued if the string input value for TIMESTAMPDIFF function has more than six digits to the right of the decimal point.

### **Static SQL applications that use parallelism**

DB2 incrementally rebinds the statements that use parallelism after migration to DB2 10. Incremental rebinds can cause performance degradation. If you use the access control authorization exit (DSNX@XAC) for authorization, incremental rebinds can cause authorization failures because they trigger authorization checks of static SQL statements when the package is executed. The authorization checks are performed on the primary authorization ID during incremental rebinds.

You should manually rebind those statements that use parallelism after migration. You can run a query in job DSNTIIPM before you migrate to determine which statements can use parallelism, and are therefore candidates for incremental rebinds. You should consider rebinding those statements after migration, as soon as your DB2 10 system is stable. After you migrate to DB2 10, you can also run a performance trace, class 3 or class 10 for IFCID 360, to identify the plans and packages that contain static SQL queries that use parallelism, and therefore need to be rebound.

### **Enforced SELECT authorization checking for UPDATE and DELETE statements**

DB2 10 checks for the SELECT privilege or appropriate administrative privilege before allowing a user to execute UPDATE or DELETE statements that reference an existing value in the target table. This authorization checking applies regardless of how the statements are executed (for example, bound in a package or executed in a dynamic statement). The authorization now also applies regardless of the setting of the SQLRULES(STD) bind option for static statements or the CURRENT RULES special register for dynamic statements. If the user does not have the necessary SELECT authorization or administrative privilege, a negative SQLCODE is returned.

## Increased limit for work file record length

In DB2 10 new-function mode, the limit for the row length in the result of a JOIN or the row length of a SORT record is increased from 32 767 bytes (1 page) to 65 529 bytes. The sort key maximum length is also increased from 16 000 bytes to 32 000 bytes. Applications that exceed the old limits fail in conversion mode (from both Version 8 and Version 9) with SQLCODE -670 or SQLCODE -136.

## New restrictions for EXPLAIN tables

In DB2 10 conversion mode (from both Version 8 and Version 9), EXPLAIN tables must be in Version 8 or later format and preferably encoded in Unicode. When EXPLAIN tables are in a format prior to the Version 8 format, DB2 returns SQLCODE -20008 reason code 2 for statements or commands that invoke EXPLAIN processing. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or DB2 9 format, regardless of the encoding type. If an EXPLAIN table is in Version 10 format and encoded in EBCDIC, SQLCODE -878 is returned. When you convert EXPLAIN tables to Unicode encoding, applications that join with EXPLAIN tables might have different results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide).

**Recommendation:** Before you begin migration to DB2 10, convert all EXPLAIN tables to the current version (8 or 9.1) format and Unicode encoding, and then check for joins to those tables. You can use job DSNTIJXA to convert most tables to current release format. You can use jobs DSNTIJXB and DSNTIJXC to migrate EBCDIC-encoded EXPLAIN tables to Unicode.

## MEMBER CLUSTER table spaces indicated by MEMBER\_CLUSTER column

In previous versions of DB2, a "K" or "I" in the TYPE column of the SYSTABLESPACE catalog table indicated that the table space had MEMBER CLUSTER structure. In Version 10, a new MEMBER\_CLUSTER column on the SYSTABLESPACE catalog table is populated during the enabling-new-function mode (from both Version 8 and Version 9) migration process. For existing MEMBER CLUSTER table spaces, values of "K" in the TYPE column of SYSTABLESPACE are replaced with "L", and values of "I" are replaced with blank. The MEMBER\_CLUSTER column is populated with "Y". After migration to enabling-new-function mode (from Version 8 or Version 9), applications that query "K" or "I" in the TYPE column must query the new MEMBER\_CLUSTER column instead.

## Changed values for the modification level in the product signature

The DB2 10 product signature has the form DSN1001*m*, where *m* is the modification level. Values 0 and 1 are reserved for maintenance levels in conversion mode from Version 8, conversion mode\* from Version 8, enabling-new-function mode from Version 8, and enabling-new-function mode\* from Version 8. Values 2 and 3 are for maintenance levels in conversion mode from Version 9, conversion mode\* from Version 9, enabling-new-function mode from Version 9, and enabling-new-function mode\* from Version 9. Values 5, 6, 7, 8, and 9 are for maintenance levels in new-function mode. Value 4 is undefined.

## Changed behavior for the CREATE FUNCTION statement

In all forms of the CREATE FUNCTION statement, a parameter list is required. Functions without parameters must have empty parentheses specified, as in the following example: CREATE FUNCTION F1 ( ) RETURNS INT RETURN 1.

In previous releases, if you specified CREATE FUNCTION without a parameter list (for example, CREATE FUNCTION F1 RETURNS INT RETURN 1), you received no errors. In DB2 10, if you specify CREATE FUNCTION without a parameter list, DB2 issues an error.

Also, a CREATE FUNCTION statement for a non-inline SQL scalar function cannot have a parameter that is a distinct type that is based on a LOB data type. The inline SQL scalar functions have supported, and will continue to support, distinct type parameters where the underlying base data type is a LOB. For the syntax of this statement, see CREATE FUNCTION in the DB2 for z/OS SQL Reference Guide.

### **Different SQLSTATE returned for some DELETE or UPDATE statements**

In previous releases of DB2, a SQLSTATE value of "00000" was returned for some DELETE or UPDATE statements that did not contain a WHERE clause, when SQLWARN flags were set. Those situations occurred during bind processing. As of DB2 10, a SQLSTATE value of "01504" is returned in those situations. This change does not affect SQL statements that are executed on behalf of a DB2 for z/OS requester.

### **Changed default behavior of multiple-row inserts for ODBC z/OS applications**

As of DB2 10, the default behavior for multiple-row inserts is changed from non-atomic to atomic. To change the default behavior back to non-atomic, set keyword PARAMOPTATOMIC = 0 in the data source section of the ODBC initialization file.

### **Changes to ALTER TABLESPACE statement error codes**

Before DB2 10 conversion mode (from Version 8 or Version 9), if you execute an ALTER TABLESPACE MAXPARTITIONS statement on catalog objects, DB2 issues SQLCODE -644. After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), DB2 issues SQLCODE -607.

Also before DB2 10 conversion mode (from Version 8 or Version 9), if you execute an ALTER TABLESPACE MAXPARTITIONS statement with a value of MAXPARTITIONS that is invalid with the page size and DSSIZE values, DB2 issues SQLCODE -4701. After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), DB2 issues SQLCODE -644.

### **Change to CREATE and ALTER statements**

CREATE and ALTER statements for native SQL procedures no longer support the DEFAULT keyword for the SQL PATH option.

### **Change to DESCRIBE statement**

In DB2 10, when a DESCRIBE statement is used on a result table that includes a distinct type, it will now return information about the distinct type.

### **New restrictions on using DSNTIAUL**

DSNTIAUL can no longer be used to process CREATE FUNCTION (SQL scalar) statements that would result in a package or CREATE TRIGGER statements. DSNTIAUL also cannot be used to process any other statement that contains *SQL-routine-body*. These statements are CREATE PROCEDURE (SQL external), CREATE PROCEDURE (SQL native), CREATE FUNCTION (SQL table), ALTER PROCEDURE (SQL native) with an ADD or REPLACE clause, and ALTER FUNCTION (SQL scalar) with an ADD or REPLACE clause.

## Changes to SYSROUTINES

As of DB2 10, the CREATEDTS column of SYSIBM.SYSROUTINES will always reflect the time that a CREATE statement was first issued for a routine. In previous releases of DB2, the CREATEDTS column might have contained different values if multiple versions of a routine were created.

## Catalog restructured

In DB2 10, the DB2 catalog is restructured to reduce lock contention. As a result, binding takes longer in DB2 10 than it did in previous versions. Also, execution of the DECLARE GLOBAL TEMPORARY TABLE statement takes longer in DB2 10.

## Changed data type for an untyped parameter marker

In previous releases, an untyped parameter marker for a unary minus operator has an assumed DOUBLE data type. In DB2 10, the assumed data type is DECFLOAT(34).

## Changes to handling of special values Infinity, sNaN, and NaN

In previous releases, when DB2 returns a decimal floating-point (DECFLOAT) value for Infinity, NaN, or sNaN as a CHAR or VARCHAR string, the string is in mixed case. In DB2 10, the values are returned in upper case as follows: INFINITY, NAN, or SNAN.

## Changes for INSTEAD OF triggers

Changes are introduced for existing INSTEAD OF triggers that were defined on a view that has a ROWID column or a column that is based on an underlying column of any of the following types:

- A security label column.
- A row change timestamp column.
- A column that is defined with AS ROW BEGIN.
- A column that is defined with AS ROW END.
- A column that is defined with AS TRANSACTION START ID.

For such INSTEAD OF triggers, the following actions now fail with a negative SQLCODE:

- Rebinding the INSTEAD OF trigger package.
- Dropping and re-creating the INSTEAD OF trigger.
- Running the REPAIR DBD utility on a database that includes the INSTEAD OF trigger.
- Issuing ALTER TABLE ALTER COLUMN SET DATA type on a table that has a view on which the INSTEAD OF trigger is defined.

## Change to positioned update or delete statements

### Explanation

In DB2 10, packages must be rebound if both of the following statements are true:

- The package contains static cursors that were bound in a previous version.
- The package contains dynamic UPDATE or DELETE statements that contain the WHERE CURRENT of clause. The WHERE CURRENT of clause indicates a positioned UPDATE or DELETE statement.

## Possible impact to your DB2 environment

If any such packages are not rebound in DB2 10, positioned UPDATE and DELETE statements fail with SQLCODE -20249 when they run against a down-level cursor.

## Actions to take

After migration to DB2 10 conversion mode (from Version 8 or Version 9), rebound packages that contain static cursors with positioned UPDATE or DELETE statements.

## Change to stored procedure parameter values returned to non-Java clients

In previous releases, when a remote application calls a DB2 for z/OS stored procedure, the data types of the returned output data match the data types of the corresponding CALL statement arguments. Starting in DB2 10 conversion mode (from both Version 8 and Version 9), the data types of the returned output data match the data types of the parameters in the stored procedure definition. This change can cause conversion failures for some applications that use non-Java client drivers such as .NET to call stored procedures on DB2. To prepare for this change, modify the CALL requests of your non-Java client applications to specify argument types that conform to the semantics of the client driver. If you want to temporarily override the DB2 10 behavior, you can set the DDF\_COMPATIBILITY subsystem parameter to SP\_PARMS\_NJV.

The SP\_PARMS\_NJV option of the DDF\_COMPATIBILITY subsystem parameter is deprecated. Although the option is supported in DB2 10, it might be removed in a later release.

## Change to results of JDBC method PreparedStatement.setTimestamp

TIMESTAMP WITH TIME ZONE is first supported in DB2 10 new-function mode. Before DB2 10 new-function mode, if the value that is assigned to a column (the second parameter of PreparedStatement.setTimestamp) has the java.sql.Timestamp data type, and the column data type is not known, the IBM Data Server Driver for JDBC and SQLJ chooses TIMESTAMP as the target data type. However, starting with DB2 10 new-function mode, unless the value that is assigned to the column is 0001-01-01-00:00:00.000000 or 9999-12-31-23:59:59.999999, the driver chooses TIMESTAMP WITH TIME ZONE as the column data type. If the driver chooses the TIMESTAMP data type, and the column type is actually TIMESTAMP WITH TIME ZONE, the database manager sets the time zone in the target column using the value of the IMPLICIT\_TIMEZONE DECP value. This value might differ from the value that is inserted prior to Version 10 new-function mode.

To produce the same results before and after new-function mode when PreparedStatement.setTimestamp is executed, specify a com.ibm.db2.jcc.DBTimestamp value as the second parameter.

## Change in how DB2 returns stored procedure output parameter data to remote clients

When an application on a client system calls a stored procedure on a DB2 10 for z/OS server, DB2 now handles the output parameters differently. Previously, DB2 returned stored procedure output parameters that were formatted according to the SQL type of the corresponding argument in the CALL statement. DB2 10 now returns output parameters that are formatted according to the SQL type of the corresponding parameter in the stored procedure declaration. This new behavior

provides improved performance at the server by avoiding unnecessary server data conversions. Also, this new behavior is consistent with the existing server behavior for the return of query and select output data and it is consistent with the behavior of other DB2 family servers. Therefore, it provides applications with a more consistent and predictable interface to DB2 10.

In general, for applications that conform to client standards, this change has no impact to the calling application. In some cases, however, application changes might be needed. To prepare for this change, examine your remote applications that call DB2 stored procedures. If necessary, modify the CALL statements in your remote applications to specify argument data types that match the data types of the parameters in the stored procedure definitions.

### **When the change in behavior occurs**

In general, the new behavior occurs after migration to DB2 10 conversion mode from Version 8 (CM8) or conversion mode from DB2 9 (CM9). However, the following exceptions apply:

- For applications using IBM Data Server Driver for JDBC and SQLJ type 4 connectivity to access a DB2 10 data sharing group in CM8 or CM9, where the enableSysplexWLB client property is set to true:

In such a configuration, the change in behavior occurs when the data sharing group is migrated to DB2 10 new-function mode (NFM). As long as the data sharing group is in CM8 or CM9 to support coexistence, DB2 10 uses the old behavior. The old behavior is used because the IBM Data Server Driver for JDBC and SQLJ might be caching data descriptors for outputs from the server. When the enableSysplexWLB property is set to true, the old behavior is maintained to ensure that the cached client descriptors are valid regardless of which member of the data sharing group is accessed.

To prepare for this change in behavior while DB2 10 is in CM8 or CM9 to support coexistence, test your applications with the enableSysplexWLB client property set to false. Or, test the applications against a stand-alone DB2 10 server, if such a system is available for testing. The new DB2 10 behavior will be used for each of those applications even though the DB2 data sharing group is in CM8 or CM9.

- For applications using the IBM Data Server Driver for JDBC and SQLJ or non-Java clients (such as .NET), DB2 9 or earlier:

In such a configuration, the change in behavior occurs, by default, after migration to DB2 10 CM8 or CM9. However, the change in behavior can be temporarily deferred. To temporarily override the DB2 10 behavior for returning stored procedure output parameter data to the IBM Data Server Driver for JDBC and SQLJ or non-Java clients only (such as .NET), set the DDF\_COMPATIBILITY subsystem parameter to SP\_PARMS\_NJV. The SP\_PARMS\_NJV option of the DDF\_COMPATIBILITY subsystem parameter is deprecated. Although the option is supported in DB2 10, it will be removed in a later release of DB2. For more information about DDF\_COMPATIBILITY, see Subsystem parameters that are not on installation panels.

### **Examples of application impacts**

The following examples use the IBM Data Server Driver for JDBC and SQLJ and .NET. Other drivers might behave differently. Because DB2 10 no longer converts data types when returning stored procedure output parameter data, there might be similar impacts to applications for other data types that are not discussed in the examples. If the calling application specifies arguments that are different from the

declared parameter types, then the mismatch between the argument and parameter data types is handled by the client system, according to the client's programming model and the client's capabilities. If the client performs data type conversions such as for numeric data, the result of the conversion performed by the client might differ from the result that was previously returned when the DB2 server performed the conversion.

**Example 1:** A stored procedure parameter is declared as an INTEGER data type, but the application CALL statement specifies a SMALLINT argument.

- Behavior before DB2 10: DB2 converts the INTEGER data and returns a 2-byte SMALLINT value, which maps to an Int16 .NET data type.
- New behavior in DB2 10: DB2 returns a 4-byte INTEGER value, which maps to an Int32 .NET data type.

**Sample application impact (.NET):** If the application uses an IBM Data Server .NET client, the stored procedure CALL statement now fails with an invalid conversion error because the Int16 and Int32 .NET data types are not compatible with each other. The application must be changed to specify an Int32 argument in the CALL statement as required by the .NET programming model. Applications that are coded with an Int32 argument and call stored procedures that have an INTEGER parameter require no change.

The .NET programming model enforces strong data typing. Thus, even though the argument type and the parameter type are compatible SQL types, the .NET driver enforces strong data type checking according to the .NET semantics. Refer to the .NET documentation for information about .NET strong type checking.

**Example 2:** A stored procedure parameter is declared as a REAL data type, but the application CALL statement specifies a DOUBLE argument.

- Behavior before DB2 10: DB2 converts the output data to a DOUBLE value before returning it to the client.
- New behavior in DB2 10: DB2 returns the data to the client as a REAL value.

**Sample application impact (Java):** If an application that uses the IBM Data Server Driver for JDBC and SQLJ uses the registerOutParameter() method to register the output parameter as a DOUBLE value before calling a stored procedure that has a REAL parameter, the following behavior occurs if the Java application uses the getObject() method to retrieve the output value:

- Before Version DB2 10 , DB2 converted the REAL value to a DOUBLE value and returned it to the client. The IBM Data Server Driver for JDBC and SQLJ returned the DOUBLE value directly to the application as the result of the getObject() method.
- Beginning in DB2 10 , DB2 returns the REAL value to the client. The IBM Data Server Driver for JDBC and SQLJ converts the REAL value to a DOUBLE value and returns it to application as the result of the getObject() method. APAR IC80974 for LUW clients and APAR PM58951 (JCC 3.63.131) and PM58952 (JCC 4.13.136) for z/OS clients are required in the IBM Data Server Driver for JDBC and SQLJ to ensure that the conversion is completed by the getObject() method. If the APAR fix is not applied, the Java application gets a ClassCastException.

**Example 3:** A stored procedure parameter is declared as a TIMESTAMP data type, but the application CALL statement specifies a VARCHAR argument.



- Behavior before DB2 10: DB2 converts the fixed-length `TIMESTAMP` data and returns a 26-byte `VARCHAR` value, containing a `TIMESTAMP` value in ISO format (`yyyy-mm-dd-hh.mm.ss[.ffffff]`). The `VARCHAR` value maps to a `String` .NET data type.
- New behavior in DB2 10: DB2 returns a 26-byte fixed-length `TIMESTAMP` value, containing a `TIMESTAMP` value in ISO format. The `TIMESTAMP` value maps to a `DateTime` .NET data type.

**Sample application impact (Java):** If the application uses the IBM Data Server Driver for JDBC and SQLJ, then an application change might be required, depending on what method the Java application uses to retrieve the parameter data.

- Before DB2 10, the `getString()` method previously returned `TIMESTAMP` data in ISO format, while the `getTimestamp()` method returned `TIMESTAMP` data in Java format
- Beginning in DB2 10, both the `getString()` and `getTimestamp()` methods return the `TIMESTAMP` value in Java format (`yyyy-mm-dd hh:mm:ss[.ffffff]`).

An application change might be required if the Java application uses the `getString()` method and the application depends on receiving `TIMESTAMP` values in ISO format. Applications that use the `getTimestamp()` method require no change.

Similar considerations apply for `TIME` parameters. DB2 returns `TIME` parameters as `TIME` data values in ISO format (`hh.mm.ss`), regardless of the SQL type of the corresponding argument in the `CALL` statement. For Java applications, the `getString()` method now returns `TIME` data in Java format (`hh.mm.ss`). If a Java application uses the `getString()` method and requires `TIME` data in ISO format, the application must be examined for possible changes.

## Changes to datetime built-in functions

### Explanation

Many datetime functions allow arguments containing *string representations of datetime values*. Valid formats for those strings are described in `String representations of datetime values (DB2 SQL)`.

In DB2 10 conversion mode (from Version 8 or Version 9), the following additional string formats are allowed in the specified limited contexts:

- A string value of seven characters representing a date is allowed as an argument to the `DATE` function only.
- A string value of 8, 13, or 14 characters representing a point in time is allowed as an argument to the `TIMESTAMP` function only.

### Possible impact to your DB2 environment

After migration to DB2 10, applications that provide a seven-character string argument to represent a date for built-in functions other than the `DATE` function will return an error. Applications that provide a string value of 8, 13, or 14 characters to represent a point in time as an argument for built-in functions other than the `TIMESTAMP` function also return an error.

## **Actions to take**

To prepare for this change, use valid string formats that are described in String representations of datetime values (DB2 SQL) in arguments for all of your datetime functions.

## **SQLCODE change for subsequent CAF CONNECT attempts**

### **Explanation**

In previous releases, a call attachment facility (CAF) CONNECT request that is followed by another CONNECT request without an intervening disconnect results in a zero return code. In DB2 10, if the second CONNECT request is for a different or unknown subsystem, group attachment, or subgroup attachment name, a -924 SQLCODE is returned. If the second CONNECT request is for the same subsystem, group attachment, or subgroup attachment name, a +361 SQLCODE is returned. A failed attempt to connect to the CAF does not change the current connection. Therefore, in both of these scenarios, the existing CAF connection persists.

### **Possible impact to your DB2 environment**

Some of your applications might receive a -924 or +361 return code where a zero return code was previously returned.

## **Actions to take**

Review your applications for subsequent CONNECT requests for CAF. Modify these applications to handle the new SQLCODEs or rewrite the applications to remove subsequent CONNECT requests.

## **Change to serialization of an empty XML element**

### **Explanation**

In DB2 DB2 9, the XML2CLOB function was deprecated, and in DB2 DB2 10, XML2CLOB is no longer supported. The replacement for XML2CLOB is explicit or implicit execution of XMLSERIALIZE. XMLSERIALIZE and XML2CLOB serialize empty XML elements in different ways. XML2CLOB serializes an empty XML element as a start-element tag followed by an end-element tag (for example, <emptyElement></emptyElement>). XMLSERIALIZE serializes an empty XML element as a start-element tag followed by an end-element tag (for example, <emptyElement></emptyElement>), or as an empty-element tag (for example, <emptyElement/>).

### **Possible impact to your DB2 environment**

Applications that depend on serialization of an empty XML element as a start-element tag followed by an end-element tag might receive errors.

## **Actions to take**

After you migrate to DB2 DB2 10, you can set subsystem parameter XML\_RESTRICT\_EMPTY\_TAG to YES. This setting causes DB2 to always serialize an empty XML element as a start-element tag followed by an end-element tag.

## Data types of output arguments from a stored procedure call in a Java application

In DB2 10 new-function mode, when a Java application that uses the IBM Data Server Driver for JDBC and SQLJ calls a stored procedure, the data types of stored procedure output arguments match the data types of the parameters in the stored procedure definition.

### Explanation

Before DB2 10, if a Java client called a DB2 for z/OS stored procedure, the data types of output arguments matched the data types of the corresponding CALL statement arguments. Starting in DB2 10, the data types of the output arguments match the data types of the parameters in the stored procedure definition.

### Possible impact to your DB2 environment

If the version of the IBM Data Server Driver for JDBC and SQLJ is lower than 3.63 or 4.13, a `java.lang.ClassCastException` might be thrown when an output argument value is retrieved.

### Actions to take

Take one of the following actions:

- Upgrade the IBM Data Server Driver for JDBC and SQLJ to version 3.63 or 4.13, or later.
- Modify the data types in `CallableStatement.registerOutParameter` method calls to match the parameter data types in the stored procedure definitions. You can set application compatibility to V10R1 and run a trace for IFCID 0366 or 0376 to identify affected applications. Trace records for those applications have a QW0366FN field value of 8.

### Related reference:

Subsystem parameters that are not on installation panels

## Change to IBM Data Server Driver for JDBC and SQLJ handling of **TIMESTAMP WITH TIME ZONE** data type

Before DB2 10 new-function mode, the **TIMESTAMP WITH TIME ZONE** data type was not supported. If a Java client application passed a timestamp input value to a **TIMESTAMP** column, the IBM Data Server Driver for JDBC and SQLJ did not include the local time zone with the timestamp value. Starting with DB2 10 new-function mode, the **TIMESTAMP WITH TIME ZONE** data type is supported. If a Java client application passes a timestamp input value to a **TIMESTAMP** column, the IBM Data Server Driver for JDBC and SQLJ constructs a timestamp input value that includes the local time zone. If the value that the driver sends to the server is out of supported range for the server, the application receives **SQLCODE -181**. You can temporarily prevent this error by including **IGNORE\_TZ** in the settings for the **DDF\_COMPATIBILITY** subsystem parameter.

## Delimiters used for accessing tables on DB2 for Linux, UNIX, and Windows

### Explanation

DB2 10 resolves aliases prior to sending SQL statements to a remote site for applications that use system-directed access. During a remote package bind against the remote site, modified SQL statement text is bound on the remote system. The **DRDA\_RESOLVE\_ALIAS** subsystem parameter is provided in Version 8 and DB2 9

to help verify applications that are affected by this change of behavior before you migrate to DB2 10.

### Possible impact to your DB2 environment

This change can impact applications that access a DB2 for Linux, UNIX, and Windows server if the SQL preprocessing option QUOTE or QUOTESQL is used. QUOTE or QUOTESQL specifies that a quotation mark (") is used as the string delimiter and an apostrophe (') is used for SQL identifiers in SQL statements. This option does not control how the COBOL compiler processes string delimiters within the application program statements. DB2 for Linux, UNIX, and Windows does not support statement strings that have been precompiled under the QUOTE or QUOTESQL option and returns a warning on the BIND command. DB2 for z/OS does use the precompiler option to govern which string delimiter to use for SQL identifiers when modifying the SQL text. This causes a bind or rebind to fail on DB2 for Linux, UNIX, and Windows in DB2 10 when the QUOTE or QUOTESQL precompiler option is used to generate the DBRM that is the source of the remote bind package processing.

### Actions to take

When accessing a remote table on a DB2 for Linux, UNIX, and Windows server using an alias, applications must be precompiled using the APOST or APOSTSQL option. Character string literals must be delimited by apostrophes and SQL identifiers must be delimited by quotation marks.

### Changes to the LTRIM, RTRIM and STRIP scalar functions Explanation

In DB2 10, the LTRIM, RTRIM, and STRIP scalar functions are changed in the following ways:

- When the *string-expression* argument to LTRIM, RTRIM, or STRIP is a mixed data string but contains an invalid sequence of characters, the function raises SQLCODE -171. Prior versions of DB2 tolerated invalid sequences of characters. For example, suppose that you issue the following SQL statement:

```
SELECT HEX(RTRIM(C1)) FROM T;
```

Also suppose column C1 contains X'40400F0F4040'. This is an invalid mixed data string, because two consecutive shift-in control characters (X'0F') is illegal. In prior versions, this statement would return X'40400F0F'. In DB2 10, this statement would return SQLCODE -171 because the argument is an invalid EBCDIC mixed data string.

- When the *string-expression* argument to LTRIM, RTRIM, or STRIP is an EBCDIC mixed data string, a shift-out control character (X'0E') followed immediately by a shift-in control character (X'0F') are trimmed, along with instances of the trim-character. In prior versions of DB2, the shift-out character and shift-in character are not returned. For example, suppose that you issue the following SQL statement:

```
SELECT HEX(RTRIM(C1)) FROM T;
```

Also suppose that column C1 contains X'40400E0F4040'. In DB2 10, this statement returns an empty string. The X'0E0F' is removed, and then all of the blanks are trimmed, leaving no other characters. In DB2 9, this statement returns X'40400E0F'. The X'0E0F' is not removed, and no blanks to the left of those control characters are removed.

## Possible impact to your DB2 environment

In rare cases, these changes might cause applications running the LTRIM, RTRIM or STRIP functions to produce different results, or introduce an error for jobs that would originally complete successfully.

### Actions to take

These changes occur in DB2 10 conversion mode. You can temporarily override these changes on a subsystem level by setting the BIF\_COMPATIBILITY subsystem parameter to V9\_TRIM. You can temporarily override these changes on an application level by adding schema SYSCOMPAT\_V9 to the front of the PATH bind option or CURRENT PATH special register.

When BIF\_COMPATIBILITY is set to V9\_TRIM, or you use the schemas SYSCOMPAT\_V9.LTRIM, SYSCOMPAT\_V9.RTRIM or SYSCOMPAT\_V9.STRIP, those functions behave as they did in DB2 9. In DB2 9, invalid EBCDIC mixed data strings are tolerated, and a sequence of shift-out control characters (X'0E') followed immediately by shift-in control characters (X'0F') is not trimmed. DB2 10 allows new syntax for LTRIM and RTRIM in the form of a parameter that specifies the trim-character. This new syntax is not affected by the BIF\_COMPATIBILITY subsystem parameter. If two parameters (*string-expression* and *trim-expression*) are specified, DB2 10 behavior is returned.

To modify your applications to handle the DB2 10 behavior for these functions:

1. Set the BIF\_COMPATIBILITY subsystem parameter to V9\_TRIM only if you suspect that an application is adversely affected. The kind of EBCDIC data that would be affected is usually malformed and is not common.
2. Identify applications that need to be modified to handle this change. You can use IFCID trace 0366 to identify the affected applications. A value of 10 for QH0366FN indicates that the application is using the DB2 9 compatible LTRIM, RTRIM, or STRIP.
3. Change any affected applications to handle the new DB2 10 LTRIM, RTRIM or STRIP behavior, including stored procedures, non-inline user-defined functions, and trigger packages.
4. Rebind and prepare packages with the PATH(SYSCURRENT,SYSIIBM) rebind option to use the new DB2 10 LTRIM, RTRIM and STRIP built-in functions. Repeat this step for native stored procedures (SQLPL) and non-inline SQL scalar functions.
5. For views that reference these built-in functions, determine whether the view needs to be changed to have the expected output. Drop and re-create the views with the PATH(SYSCURRENT,SYSIIBM) option, if necessary. Rebind any applications that reference the views with the PATH(SYSCURRENT,SYSIIBM) option to use the new DB2 10 LTRIM, RTRIM and STRIP built-in functions. Repeat this step for inline SQL scalar functions.
6. For materialized query tables or extended indexes that reference these built-in functions, drop and re-create the materialized query tables or extended indexes with the PATH(SYSCURRENT,SYSIIBM) option. Issue the REFRESH TABLE statement for materialized query tables. Rebind any applications that reference the materialized query tables or extended indexes with the PATH(SYSCURRENT,SYSIIBM) option to use the new built-in functions.

Materialized query tables and extended indexes use the LTRIM, RTRIM and STRIP behavior that is specified during their creation. If a reference statement

has a different behavior that is specified by the BIF\_COMPATIBILITY parameter (or a different path), the materialized query table or expression-based index is not used.

7. Change the value of the BIF\_COMPATIBILITY subsystem parameter to CURRENT. This setting enables the new applications, rebinds, and CREATE statements to use the new LTRIM, RTRIM and STRIP functions.

### **Qualify user-defined function names**

If you use a user-defined function that has the same name as a built-in function that has been added to DB2 10, ensure that you fully qualify the function name. If the function name is unqualified and “SYSIBM” precedes the schema that you used for this function in the SQL path, DB2 invokes one of the built-in functions.

For a list of built-in functions, including those that have been added in DB2 10, see Built-in functions (DB2 SQL).

### **SQLCODE changes**

Some SQLCODE numbers and message text might have changed in DB2 10. Also, the conditions under which some SQLCODEs are issued might have changed.

### **SQL reserved words**

DB2 10 has several new SQL reserved words. Refer to Reserved words (DB2 SQL) for the list of reserved words, and adjust your applications accordingly.



### **Rebind of packages created before DB2 Version 8 when a view definition contains a literal in the select list**

The length of the literals in the select list of a view changed between DB2 Version 8 and DB2 10. If you defined views with a literal in the select list and bound packages on DB2 Version 8 or earlier, the packages must be rebound.

Without the rebind, DB2 10 might return SQLCODE -404 SQLSTATE 22001 for each attempt to use such a package until it is rebound.

## **Utility release incompatibilities for migration from Version 8**

When you migrate from Version 8 to DB2 10, be aware of the utility release incompatibilities.

Plan for the following changes in Version 9.1 and DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### **Changes to the REORG SHRLEVEL CHANGE utility (change introduced in DB2 9)**

If you use the REORG SHRLEVEL CHANGE utility, you might need to change your operating procedures. If you ran concurrent REORG TABLESPACE SHRLEVEL CHANGE PART x on the same table space in your previous DB2 release, you need to change the way you submit the jobs so that only one executes at a time. If you allocate your own shadow data sets (for example, if you use user-managed VSAM data sets), you need to change your jobs to use the NPI data

set naming convention and you need to allocate larger data sets for the NPI shadows. Also, the BUILD2 phase of REORG TABLESPACE PART x SHRLEVEL CHANGE is eliminated.

If you have not been using RETRY with REORG SHRLEVEL CHANGE or REFERENCE, in DB2 10, your REORGs retry after failed drain attempts, and if the retries are not successful, the jobs terminate with return code 8 instead of abending.

During a REORG TABLESPACE PART SHRLEVEL CHANGE, applications that access partitions other than the ones being reorganized might now encounter timeouts if they access NPI data sets during the last iteration of the LOG phase or during the SWITCH phase. Adjust the values of the DRAIN\_WAIT and MAXRO parameters to minimize application timeouts.

### **Changes to the REORG utility (change introduced in DB2 9)**

The REORG utility has been updated to reduce the amount of virtual storage that is used to build dictionaries. Because the REORG utility needs less virtual storage, the 254 partition restriction for reorganizing compressed table spaces has been removed. REORG no longer issues message DSNU1146I.

### **Changes to DSN1LOGP (change introduced in DB2 9)**

In previous releases, when you invoked DSN1LOGP with an RBA or LRSN range and the lower or higher bounds are not found in the available log files, DSN1LOGP returned return code 0. In DB2 10, when you invoke DSN1LOGP with an RBA or LRSN range and the lower or higher bounds are not found in the available log files, DB2 issues a warning message to let you know that not all of the expected information can be formatted in the available logs and returns return code 4.

### **Changes to INTEGER EXTERNAL option (change introduced in DB2 9)**

In DB2 Version 8, the INTEGER EXTERNAL option of the UNLOAD utility had a default value of 11 bytes. In DB2 10, the INTEGER EXTERNAL option has a default value of 20 bytes. To force a length of 11 bytes, you can specify INTEGER EXTERNAL(11).

### **Changes to RECOVER utility**

For point-in-time recovery, the RECOVER utility now enforces the recovery of a base table space together with its associated auxiliary LOB or XML table spaces.

### **Changes to COPY CHANGELIMIT**

The default value of the COPY CHANGELIMIT option has changed from 1,10 to 10. This new default value means that COPY creates image copies as follows:

- If the percentage of changed pages is greater than 0 and less than 10, COPY creates an incremental image copy.
- If the percentage of changed pages is greater than or equal to 10, COPY creates a full image copy.
- If no pages have changed, no copies are made.

If this behavior is not the outcome that you want for any COPY statements with the CHANGELIMIT default option, change those statements to specify appropriate CHANGELIMIT values.

## Changes to RUNSTATS INDEX

In DB2 10, the following changes are made to the RUNSTATS INDEX utility:

- The default SHRLEVEL value is changed from REFERENCE to CHANGE.
- The KEYCARD behavior is always in effect, and the KEYCARD keyword is deprecated. If you specify KEYCARD in the utility job statement, no error message is issued to indicate that the keyword is deprecated.

## Changes to DSN1PRNT

In DB2 10, when you run DSN1PRNT with the FORMAT EXPAND option, and the input data sets constitute a full image copy, the input data sets must contain all pages of the original table space, including dictionary pages.

## Changes to DSNJU004

The output of the DSNJU004 (print log map) utility has changed. The output of the system-level backup BSDS record now includes the z/OS level of the backup and the catalog copy option. This information is collected by the BACKUP system utility in DB2 10.

## Changes to LISTDEF

After you migrate to DB2 10, the LISTDEF utility supports the DEFINED YES and DEFINED NO options. By default, DEFINED YES is used, which means that only defined objects are included or excluded from LISTDEF lists. To include or exclude undefined objects in the LISTDEF, add the DEFINED NO or DEFINED ALL option.

In releases prior to DB2 10, if a LISTDEF list contains only undefined objects, issues message DSNU185I for each undefined object, and LISTDEF returns return code 0. In DB2 10, if a list returns only undefined objects, and DEFINED NO or DEFINED ALL is not specified, LISTDEF issues DSNU1008 and returns return code 4, and DSNU185I messages are not issued.

DB2 10 also adds the HISTORY option, which changes the behavior of the BASE, LOB, XML, and ALL keywords. When one of these keywords is specified and the HISTORY keyword is also specified, non-history objects are filtered out of the resulting list. When one of these keywords is specified and the HISTORY keyword is not specified, history objects are filtered out of the resulting list.

## MAX\_UTIL\_PARTS subsystem parameter removed

In DB2 10, the MAX\_UTIL\_PARTS subsystem parameter is removed. Because the LOAD utility no longer uses MAX\_UTIL\_PARTS, there is no longer a limit on the number of partitions of a compressed table space that LOAD can process when the LOAD utility control statement does not contain the PART parameter.

## Change to CHECK DATA and CHECK LOB

In DB2 10, a new subsystem parameter, CHECK\_SETCHKP, is added to specify whether the CHECK DATA and CHECK LOB utilities are to place inconsistent objects in CHECK PENDING status. By default, this parameter is set to NO, which means that if either of these utilities finds an inconsistency in an object, the object is not placed in CHECK PENDING status. In previous DB2 versions, these utilities place such objects in CHECK PENDING status. To revert to the previous behavior of placing inconsistent objects in CHECK PENDING status, set the CHECK\_SETCHKP subsystem parameter to YES.



## Command release incompatibilities for migration from Version 8

When you migrate from Version 8 to DB2 10, be aware of the command release incompatibilities.

### GUPI

Plan for the following changes in Version 9.1 and DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.


### Changes to DISPLAY command location name length (change introduced in DB2 9)

In previous releases, the DISPLAY command location name length was limited to 16 characters. Starting in Version 9.1, the length of the DISPLAY command location name can be longer than 16 characters so that the location name can have a value of an IPV6 IP address. When you implement IPV6, you should examine automation routines that examine IP addresses and make adjustments for the longer addresses.

#### Change to DISPLAY GROUP DETAIL command

In DB2 10, the output of the DISPLAY GROUP DETAIL command includes information about subgroups, if any exist.

**Related reference:**

 [-DISPLAY GROUP \(DB2\) \(DB2 Commands\)](#)

### Changes to DISPLAY THREAD command output length (change introduced in DB2 9)

In previous releases, if the DISPLAY THREAD command was issued from an MVS console, DB2 displayed 255 lines of thread output per type specified, per member. Starting in DB2 9, the DISPLAY THREAD command output displays the number of lines per member that is specified in the LIMIT keyword. The default value of LIMIT is 512 lines of output per type specified, per member.

**Related reference:**


 [-DISPLAY THREAD \(DB2\) \(DB2 Commands\)](#)

#### Change to REBIND PACKAGE command

In previous releases, the REBIND PACKAGE command did not preserve the old package copies by default. In DB2 10, old package copies are saved when REBIND PACKAGE is used. To change this default behavior, change the value of the PLANMGMT subsystem parameter to OFF.

### GUPI

**Related reference:**

 [REBIND PACKAGE \(DSN\) \(DB2 Commands\)](#)

PLAN MANAGEMENT field (PLANMGMT subsystem parameter)

## Security release incompatibilities for migration from Version 8

When you migrate from Version 8 to DB2 10, be aware of the security release incompatibilities.

Plan for the following changes in DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### Separate security and system administrator authorities

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, users with SYSADM authority can no longer manage security objects such as trusted contexts and roles, issue grants, or revoke grants that are made by others. Also, users with SYSCTRL authority can no longer manage roles, issue grants, or revoke grants that are made by others.

If you set SEPARATE SECURITY to NO, which is the default, the SYSADM and SYSCTRL authorities have the same privileges as in the previous release.

### Changes to the sample connection routine (DSN3SATH)

In previous versions of DB2, DSN3SATH retrieved the list of secondary authorization IDs from the address-space-level ACEE for connection processing for utilities that run in batch mode. DSN3SATH included code to retrieve the list of secondary authorization IDs from a task-level ACEE, but that code was commented out. In DB2 10, DSN3SATH has been changed to use the task-level ACEE in this case. This change lets utilities that run under stored procedures retrieve the list of secondary authorization IDs from a task-level ACEE.

### Restriction for SET CURRENT SQLID

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, there is an additional restriction for the SET CURRENT SQLID statement. If any of the authorization IDs of the process has SYSADM authority, then CURRENT SQLID must be set to one of the authorization IDs of the application process.

### Restriction for BIND PACKAGE OWNER and BIND PLAN OWNER

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, there is an additional restriction for the BIND PACKAGE OWNER and the BIND PLAN OWNER. If any of the authorization IDs of the process has SYSADM authority or SYSCTRL authority, then the OWNER must be set to one of the authorization IDs of the process.

### Additional role name restrictions

Previous releases prohibited using SYSADM, SYSCTRL, or PUBLIC as role names. As of Version 10, role names cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, SQLADM, or any name beginning with "SYS."

### Online-updatable subsystem parameters

In previous versions of DB2, users with SYSOPR or higher authorities can update the online-updatable subsystem parameters. In DB2 10, the security-related subsystem parameters can only be updated by users that have SECADM or installation SYSADM authority. The subsystem parameters that are affected by this change are:

- AUTHCACH

- BINDNV
- DBACRVW
- EXTSEC
- TCPALVER

## Storage release incompatibilities for migration from Version 8

When you migrate from Version 8 to DB2 10, be aware of the storage release incompatibilities.

Plan for the following changes to DB2 9 and DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### Changes to the format of the BSDS (change introduced in DB2 9)

In releases prior to DB2 9, you could have the BSDS in a format that allowed only 1000 data sets per copy for archive logs and 31 data sets per copy for active logs. In DB2 10, the BSDS must be in the format that supports up to 10,000 data sets per copy for archive logs and 93 data sets per copy for active logs. Any unconverted BSDSs are converted by the DSNJCNVB module as part of job DSNTIJUZ. To determine if DSNJCNVB has already been run, use the DSNJU004 utility. BSDSs that have been converted are unaffected by running DSNTIJUZ.

### The work file database is the only temporary database (change introduced in DB2 9)

Starting in DB2 9, the work file database is the only temporary database. The work file database is used for all temporary tables, both external and internal, which simplifies DB2 systems management tasks. The TEMP database is no longer used by DB2. The TEMP database is deprecated and support is likely to be removed in the future.

If you explicitly or implicitly granted privileges on the TEMP database in a previous version of DB2, you need to grant those privileges on the work file database to avoid unexpected authorization errors.

### Work file table spaces are now created on DB2-managed storage during installation (change introduced in DB2 9)

In releases prior to DB2 9, the DB2 installation process created work file table spaces on user-managed storage. In DB2 10, the installation process creates work file table spaces on DB2-managed storage. The default storage group is SYSDEFLT. You can specify a different, user-managed storage group by modifying the parameters in the last step of installation job DSNTIJTM.

#### Related concepts:

Work file database storage requirements

#### Related reference:

DSNTIP9: Work file database panel

### **At least one 32 KB work file table space is required (change introduced in DB2 9)**

Starting in DB2 9, you must define at least one 32 KB work file table space. In DB2 Version 8, 4 KB work file table spaces were used whenever possible. In DB2 10, 32 KB work file table spaces are used when a row length is more than 100 bytes.

### **Declared global temporary tables and static scrollable cursor result tables require a table space with a 32 KB page size (change introduced in DB2 9)**

Declared global temporary tables and static scrollable cursor result tables require at least one of the table spaces in the work file database to have a 32 KB page size. Eight KB and 16 KB page sizes are not supported for table spaces that are created in the work file database. Member DSNTESQ of the *prefix.SDSNSAMP* library contains a sample query to check your work file database.

Also, global temporary tables require a 32 KB buffer pool, which is required to install DB2. Existing jobs that create a table space in the temporary database might also need to be modified.

### **New limits for the number of work file table spaces and indexes (change introduced in DB2 9)**

The number of table spaces in the work file database cannot exceed the limit of 500. The number of indexes that are defined on declared global temporary tables that belong to all agents on the local DB2 member cannot exceed the limit of 10000.

### **You can use the installation CLIST to add table spaces to the work file database as part of the migration process (change introduced in DB2 9)**

In releases prior to DB2 9, you could create table spaces in the work file database only in the INSTALL mode of the installation CLIST. In DB2 10, you can create zero or more additional table spaces in the work file database in the MIGRATE mode of the installation CLIST. The segment size of the table spaces is restricted to 16 until DB2 enters new-function mode.

### **You can specify 4 KB, 8 KB, 16 KB, or 32 KB buffer pools for user indexes (change introduced in Version 9.1)**

In releases prior to DB2 9, you could specify only 4 KB buffer pools for user indexes. In DB2 10, you can specify 4 KB, 8 KB, 16 KB, or 32 KB buffer pools for user indexes. Indexes that are created during conversion mode from Version 8 require a 4 KB buffer pool, so you need to specify a 4 KB buffer pool in the BUFFERPOOL clause when you create an index. If you don't specify a 4 KB buffer pool in the BUFFERPOOL clause when you create an index in conversion mode from Version 8, DB2 issues SQLCODE = -676, ERROR: ONLY A 4K PAGE BUFFERPOOL CAN BE USED FOR AN INDEX.

## **Other release incompatibilities for migration from Version 8**

When you migrate from Version 8 to DB2 10, be aware of the release incompatibilities.

Plan for the following changes in Version 9.1 and DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

## The GROUP ATTACH process is randomized (change introduced in DB2 9)

In DB2 DB2 Version 8, if more than one subsystem was running on a z/OS image in a data sharing group, incoming jobs went to the first active DB2 subsystem. Starting in DB2 9, the GROUP ATTACH process is randomized by default so that all members that are defined in a data sharing group and running on a z/OS image have an equal chance of getting the attach from a starting application if the application specifies a GROUP ATTACH name instead of an individual subsystem name.

To change the DB2 10 behavior to the behavior of DB2 Version 8, set the RANDOMATT subsystem parameter to NO for all members of the data sharing group. Alternatively, you can set RANDOMATT for one member of the group to YES, which causes group attachment requests to attempt to connect to that member before attempting to connect to others.

## Changed default values for some subsystem parameters and installation panel fields

The default values for some subsystem parameters and installation panel fields have changed. The new values are listed in the following table.

Table 14. Subsystem parameters and installation panel fields with new default values

Parameter	Field	Panel	Version 8 default value	DB2 10 default value
none	BP8K0	DSNTIP2	1000	2000
none	DATABASES	DSNTIPE	100	200
CACHEPAC	PACKAGE AUTH CACHE	DSNTIPP	100K	5M
CACHERAC	ROUTINE AUTH CACHE	DSNTIPP	100K	5M
CHKFREQ	MINUTES/CHECKPOINT	DSNTIPL1	500000 records	5 minutes
CONTSTOR	CONTRACT THREAD STG	DSNTIPE	NO	YES
DB2SORT	UT DB2 SORT USE (none in Version 8)	DSNTIP61	DISABLE	ENABLE
DLDFREQ	LEVELID UPDATE FREQ	DSNTIPL1	5	ON
DSMAX	DSMAX	DSNTIPC	9960	20000
EDMDBDC	EDM DBD CACHE	DSNTIPC	102396K	23400K
EDMPOOL	EDMPOOL LIMIT BELOW THE BAR	DSNTIPC	32767K	0 <sup>1</sup>
EDMSTMTC	EDM STATEMENT CACHE	DSNTIPC	102396K	113386K
IRLMRWT	RESOURCE TIMEOUT	DSNTIPI	60	30
IRLMSWT	TIME TO AUTOSTART	DSNTIPI	300	120
LRDRTHLD	LONG-RUNNING READER	DSNTIPE	0	10
MAXRBLK	RID POOL SIZE	DSNTIPC	8000K	400000K
MONSIZE	MONITOR SIZE	DSNTIPN	256K	1M
NUMLKTS	LOCKS PER TABLE(SPACE)	DSNTIPJ	1000	2000
PCLOSEN	RO SWITCH CHKPTS	DSNTIPL1	5	10
PRIVATE_PROTOCOL	none	none	YES	NO
RRULOCK	U LOCK FOR RR/RS	DSNTIPI	NO	YES
SEQCACH	none	none	BYPASS	SEQ

Table 14. Subsystem parameters and installation panel fields with new default values (continued)

Parameter	Field	Panel	Version 8 default value	DB2 10 default value
SEQPRES	none	none	NO	YES
SRTPOOL	SORT POOL SIZE	DSNTIPC	2000K	10000K
STATIME	STATISTICS TIME	DSNTIPN	5	1
STATROLL	STATISTICS ROLLUP	DSNTIP61	NO	YES
URCHKTH	UR CHECK FREQ	DSNTIPL1	0	5
URLGWTH	UR LOG WRITE CHECK	DSNTIPL1	0	10K

1. Although the default value of EDMPOOL is 0, if you are migrating from Version 8, you should use the same value for EDMPOOL that you used in Version 8. For more information about setting this parameter, see EDM LIMIT BELOW THE BAR (EDMPOOL subsystem parameter).

If the values that you specified for these parameters are lower than the new default values, you might want to increase your values.

### Changed maximum values for some subsystem parameters

The maximum values for some subsystem parameters have changed. The new values are listed in the following table.

Table 15. Subsystem parameters with new maximum values

Parameter	Version 8 maximum value	DB2 10 maximum value
CACHEPAC	5M	10M
CACHERAC	5M	10M
CTHREAD	2000	20000
DSMAX	100000	200000
DSSTIME	1440	60
IDBACK	2000	20000
IDFORE	2000	20000
MAXDBAT	1999	19999
MONSIZE	16M	64M
STATIME	1440	60

### Changed acceptable values for subsystem parameter NPGTHRSH (change introduced in DB2 9)

Starting in DB2 9, a value of -1 for subsystem parameter NPGTHRSH is no longer supported. The acceptable values for NPGTHRSH are 0 or any integer greater than 1.

### Changed acceptable values for the DLDFREQ parameter

The values 0 through 32767 for the DLDFREQ subsystem parameter are no longer supported in DB2 10. The acceptable values for DLDFREQ in DB2 10 are ON and OFF. A value of 0 in previous releases corresponds to a value of OFF in DB2 10. Values 1 through 32767 in previous releases correspond to a value of ON in DB2 10.

### Changed minimum value for the MONSIZE parameter

The minimum value for the MONSIZE subsystem parameter has changed from 256K to 1M.

### **Changed minimum value for the OUTBUFF parameter**

The minimum value for the OUTBUFF parameter has changed from 40K to 400K. If you specify a value less than 400K, the installation process changes the value to 400K. Check the region size in the startup procedure for the DB2 system services address space (DSN1MSTR) to ensure that it is large enough to accommodate the increased output buffer size. The recommended setting for the REGION size of the address space is 0M.

### **Changes to STATIME and SYNCVAL parameters**

In DB2 10, the STATIME and SYNCVAL subsystem parameters apply only to IFCIDs 0105, 0106, and 0199. IFCIDs 0001, 0002, 0202, 0217, 0225, and 0230 are no longer controlled by STATIME and SYNCVAL, and the corresponding trace records are written at fixed, one-minute intervals.

### **Changed maximum degree of parallelism for parallel groups**

DB2 10 uses a changed maximum degree of parallelism when the subsystem parameter PARAMDEG is set to 0. To avoid storage shortages, the maximum degree of parallelism has been reduced from ten times the number of CPUs to two times the number of CPUs. If an increase in elapsed time for parallel queries is a problem, specify a value for PARAMDEG that is greater than two times the number of CPUs.

### **Ensure that the access control authorization exit routine is compatible with DB2 10**

Ensure that the access control authorization exit routine (DSNX@XAC) is compatible with DB2 10. The access control authorization exit routine needs to turn on the DB2 10 version identifier (EXPLV10) during access control exit initialization processing. For more information about other DB2 10 changes to the access control authorization exit, see Considerations for the access control authorization routine (Managing Security).

### **Changes to the real-time statistics tables (change introduced in DB2 9)**

In DB2 10 new-function mode, the real-time statistics tables are part of the DB2 catalog. In DB2 10 conversion mode from Version 8, the real-time statistics data is still in the user-defined tables. During enabling-new-function mode from Version 8 processing, job DSNTIJEN moves the real-time statistics data from your user-defined tables to catalog tables SYSIBM.SYSTABLESPACESTATS and SYSIBM.SYSINDEXSPACESTATS. If you do not have a user-defined real-time statistics database (DSNRTSDB) defined, DSNTIJEN issues a warning. If you revert to conversion mode\* from Version 8, DB2 keeps the real-time statistics data in the catalog tables and does not use the user-defined tables. You can drop the user-defined tables after job DSNTIJEN moves the data to the catalog tables.

In releases before DB2 9, in the user-defined real-time statistics tables, the data types of TOTALROWS and SPACE in SYSTABLESPACESTATS and TOTALENTRIES in SYSINDEXSPACESTATS were FLOAT. In DB2 10, they are the BIGINT data type.

For migration from DB2 Version 8, if you did not use real-time statistics in DB2 Version 8, some real-time statistics values remain null in DB2 10 until you run the appropriate utility to establish starting points for the counters.

#### **Related information:**

How utilities affect the real-time statistics (DB2 Performance)

Setting up your system for real-time statistics (DB2 Performance)

## **Changes to resource limit facility tables (change introduced in DB2 9)**

In releases before DB2 9, there was a single type of resource limit facility table with a name of the form *authid.DSNRLSTnn*. If the START RLIMIT command was executed and the resource limit facility table did not exist, the START RLIMIT command terminated. In DB2 10, there are two types of resource limit facility tables: tables of the form *authid.DSNRLSTnn* and tables of the form *authid.DSNRLMTnn*. In DB2 10 conversion mode from Version 8, if *authid.DSNRLSTnn* does not exist, START RLIMIT terminates. In DB2 10 new-function mode, the START RLIMIT command can complete successfully if either type of resource limit facility table exists.

## **Resource limit facility changes**

Before DB2 10, resource limit facility (RLF) limits applied to connections from remote users. These limits applied, regardless of whether the primary or secondary authorization IDs of the users had installation SYSADM or installation SYSOPR authority. Starting with DB2 10, no RLF limits apply to primary or secondary authorization IDs that have installation SYSADM or installation SYSOPR authority.

## **Changed behavior for DDF to use getaddrinfo() instead of gethostid() to obtain IP addresses**

DB2 10 is an IPv6 system and cannot use gethostid() to obtain IP addresses because gethostid() does not support IPv6. Instead, DDF uses getaddrinfo() to obtain IP addresses. getaddrinfo() resolves the host name that is obtained from gethostname() to one or more IP addresses that are specified in the DNS or local host file. Therefore, it is important that the TCP/IP host name that is obtained from gethostname() matches the host name that is specified as part of the domain name in the DNS or local host file, so that an IP address can be obtained.

For details about other methods of specifying an IP address, see “Starting TCP/IP support” on page 976.

## **Changed behavior with reactive governing (change introduced in DB2 9)**

The resource limit facility no longer accumulates ASUTIME across SQL statement boundaries. For reactive governing, DB2 resets the ASUTIME after a single statement execution is completed for a parameter marker in an INSERT or UPDATE statement, or after the close and reopen of a cursor for a FETCH statement. You might need to change your ASUTIME values in the resource limit facility to account for the new behavior. However, if you fall back to DB2 Version 8, you need to adjust the ASUTIME values again to prevent -905 errors.

## **Fewer SMP/E jobs are required (change introduced in DB2 9)**

Because utilities are now contained in a single FMID, SMP/E jobs DSNRECVM, DSNRECVS, DSNAPPLM, DSNAPPLS, DSNACCPM, and DSNACCPs have been deleted.

## **DB2 10 requires IRLM 2.3**

IRLM 2.3 is delivered with DB2 10. You must use the supplied IRLM procedure. Although IRLM 2.3 is required in DB2 10, you can use the DXRRL183 load module from IRLM 2.2.

## **Changes to table space types**

The default table space type for new tables is now the partition-by-growth universal table space. The partitioned table space type is deprecated. In



new-function mode, you can use an ALTER statement to change single-table table spaces to partition-by-growth universal table spaces.

You cannot use an ALTER statement to change multiple-table table spaces to universal table spaces.

### **Altered catalog and directory table spaces**

During processing in enabling-new-function mode (from both Version 8 and Version 9), some catalog and directory table spaces are altered to use row-level locking and some tables use reordered-row format. Changes to the structure of the catalog also include new table spaces, new tables, and the use of new LOB columns. As a result, backup and recovery for the catalog is substantially changed.

### **DSNTIJIC uses SHRLEVEL CHANGE to copy the DB2 catalog and directory**

In DB2 10, job DSNTIJIC is modified to specify SHRLEVEL CHANGE rather than SHRLEVEL REFERENCE. This modification allows other tasks to update the DB2 catalog and directory while DSNTIJIC is executing. If you want to restrict other tasks to only access the catalog and directory when DSNTIJIC is executing, modify your customized copy of DSNTIJIC to use SHRLEVEL REFERENCE.

### **Change to job DSNTIJMV**

In DB2 10, job DSNTIJMV is modified to use the keyword parameter format for the subsystem parameter control statement in IEFSSNxx members. In previous versions, job DSNTIJMV used the positional parameter format. The two parameter formats cannot be used together in the same IEFSSNxx member.

Example of keyword parameter format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
  INITPARM('DSN3EPX,cmd-prefix<,<scope<,<group-attach<<,<subgroup-attach>>>')
```

Example of positional parameter format:

```
ssname,DSN3INI,'DSN3EPX,cmd-prefix<,<scope<,<group-attach<<,<subgroup-attach>>>'
```

### **Changes to pending states for ALTER statements**

Before DB2 10, some ALTER statements produce immediate definition changes, and the table space or index defined in a statement is placed in a restrictive REBUILD-pending (RBDP) or restrictive REORG-pending (REORP) state. In DB2 10 new-function mode, these same ALTER statements are pending definition changes, and the table space or index defined in a statement is placed in an advisory REBUILD-pending (ARBDP) or advisory REORG-pending (AREOR) state. Changes are applied when the table space or index is reorganized or the index is rebuilt, and data in the table space or index can be accessed or updated.

### **SYSDATE added as synonym for CURRENT TIMESTAMP(0)**

As of DB2 10, SYSDATE is a synonym for CURRENT TIMESTAMP(0). After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), if an object named SYSDATE already exists, all references to the object should specify the name as a delimited identifier ("SYSDATE") to distinguish the object from the CURRENT TIMESTAMP(0) synonym. References to SYSDATE as an ordinary identifier result in SQLCODE -4700.

### **Added precision variable for CURRENT TIMESTAMP**

As of DB2 10, an optional timestamp precision can be specified for the CURRENT TIMESTAMP special register. The precision is the number of digits of fraction seconds in the timestamp. If a user-defined function with the name

CURRENT\_TIMESTAMP already exists, all references to the function should specify the name as a delimited identifier ("CURRENT\_TIMESTAMP") after migration to DB2 10 conversion mode (from Version 8 or Version 9). References to CURRENT\_TIMESTAMP in a function call result in SQLCODE -4700.

### **Catalog and directory data sets converted to SMS-controlled**

In DB2 10, all data sets for the DB2 catalog and directory must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating data sets in extended format and to use extended addressability (EA). See member DSNTIJSS of the DB2 10 SDSNSAMP library for a sample SMS environment. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

During enabling-new-function mode (from both Version 8 and Version 9), some existing table spaces are converted to standalone table spaces. The obsolete table spaces are deleted in enabling-new-function mode (from both Version 8 and Version 9), at which time the data sets for those table spaces are also deleted. For details on the table space conversion, see "Job DSNTIJEN" on page 694.

### **SMF subtype field defined as a two-byte value**

The SMF subtype field should be defined as a two-byte value. Previously, DB2 mapped the field SM10xSTF as a single-byte field that corresponds to the high half of the standard two-byte field location. In DB2 10, SM10xSTF is changed to a two-byte field. This change results in the removal of unused field SM10xRI from the mapping. This change might require change to applications that parse SMF.

### **Changed default OP buffer size**

The online performance (OP) buffer size in DB2 10 defaults to 1 MB unless otherwise specified.

### **Change to processing of IEEE BFP values**

When an underflow IEEE BFP value is encountered during local processing, SQLCODE -802 is issued. In Version 8, no SQLCODE was issued in this case.

### **Changed sizes and definitions of trace records**

DB2 10 introduces changes to the definitions and sizes of some IFCID fields. These changes might require modifications to your trace applications.

For more information, see Changed IFCIDs in DB2 9 (DB2 for z/OS What's New?) and Changed IFCIDs in DB2 10 (DB2 for z/OS What's New?).

### **Changed format of the IFCID 0002, 0003, 0148, and 0306 trace records**

For IFCID 0002, the format of the distributed data facility area, which is mapped by QLST fields, has changed substantially. For IFCID 0003, the format of the distributed data facility area, which is mapped by QLAC fields, has changed substantially. For IFCID 0148, the format of the distributed accounting records has changed substantially. Any application that reads and interprets location statistics must be modified to account for the DB2 10 format of IFCID 0002, 0003, and 0148. For IFCID 0306, the definition of field QW0306AD has changed and the size of the area mapped by field QW0306OF has increased. The first eight bytes of field QW0306AD are now "V10" to indicate that the data is from DB2 10 and that the DB2 10 mapping should be used.

## **Change to connection and sign-on routines**

### **Explanation**

In previous releases, the EXPLSITE value that is passed to the DSN3@ATH connection and DSN3@SGN sign-on exit routines, relative to an upstream DB2 for z/OS requester system partner, could be either a network address or the partner's actual location name. In DB2 10, the connection and sign-on exit routines are passed an EXPLSITE value that reflects a network address that is relative to the DB2 for z/OS requester system.

### **Possible impact to your DB2 environment**

Because the connection and sign-on exit routines might base authentication decisions on the EXPLSITE value, you might have different authentication results in DB2 10 than in previous releases.

### **Actions to take**

To prepare for this change, examine the logic of your connection and sign-on exit routines. Determine if they have dependencies on the EXPLSITE value being relative to remote upstream DB2 for z/OS requester partner location names. If such dependencies exist, before migration to DB2 10, modify the exit routine logic to accept EXPLSITE values that are either the network address or the actual location name for upstream DB2 for z/OS requester partners. After migration to DB2 10 new-function mode, you can optionally modify the exit routines to remove dependencies on the EXPLSITE value being an actual DB2 for z/OS requester partner location name.

## **All user-defined indexes on the DB2 catalog are managed by DB2**

### **Explanation**

Beginning in DB2 10 enabling-new-function mode, any indexes that exist on the catalog are treated as being managed by DB2. New data sets are defined in the SMS environment for the DB2 catalog data sets.

### **Possible impact to your DB2 environment**

DB2 ignores any data sets that you define for user-defined indexes on the catalog that are user-managed.

### **Actions to take**

Determine whether your DB2 catalog has any user-defined indexes. These indexes are reported in job DSNTIJPM.

If these indexes exist, drop and re-create them in DB2 10 enabling-new-function mode or later.

### **Related information:**

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

Run premigration queries (DSNTIJPM)

## Functions that are no longer supported for systems migrating from Version 8

If you are migrating to DB2 10 from Version 8, be aware of the functions that are no longer supported.

The following functions are not supported in DB2 10.

### **BookManager® format is discontinued**

IBM is discontinuing the BookManager format as part of an ongoing effort to deliver the best possible information experience to our customers. IBM optimizes DB2 10 for z/OS documentation for viewing in IBM Knowledge Center.

The BookManager books will continue to be provided for the life cycle of DB2 Version 8 and DB2 9; however, IBM is not delivering BookManager books beginning in DB2 10. This includes all of the information that you are used to seeing in BookManager and PDF, plus many improved features for finding and viewing the information that you need to do your job.

### **msys for Setup DB2 Customization Center**

In DB2 10, msys for Setup DB2 Customization Center is removed. Instead, use the installation panels. For more information about using the installation panels, see Tailoring DB2 jobs to your environment using the installation CLIST.

### **Optimization Service Center**

In DB2 10, Optimization Service Center is no longer supported. The recommended no-charge query optimization and service tool is IBM Data Studio, which is a query serviceability tool for DB2 10 for z/OS. This tool is based and built on the foundation of Optimization Service Center and Optimization Expert.

### **Java stored procedures no longer run in resettable JVMs (starting in DB2 9)**

In releases before DB2 9, Java stored procedures could be run in resettable JVMs. In DB2 10, Java stored procedures cannot be run in resettable JVMs.

Because Java stored procedures cannot be run in resettable JVMs, they are no longer automatically prevented from impacting the execution of future Java stored procedures in the following ways:

- Setting system properties.
- Attempting to access or modify the security configuration objects.
- Loading a native library.

Such actions can impact the ability of other Java stored procedures to use that JVM. For more information about resettable JVMs and for a full list of actions that are prevented, see the "Unresettable actions" topic of the Persistent Reusable Java Virtual Machine User's Guide.

**Recommendation:** After you migrate to DB2 10, modify your applications that use functions of resettable JVMs to not run Java stored procedures in resettable JVMs.

## DB2-established stored procedure address spaces (starting in DB2 9)

DB2-established stored procedure address spaces are no longer supported. Stored procedures must be moved to a WLM environment.

**Recommendation:** Before you migrate to DB2 10, modify your DB2-managed stored procedures to be managed by WLM. For more information, see “WLM management of stored procedures” on page 883.

## JDBC/SQLJ Driver for OS/390® and z/OS (starting in DB2 9)

The JDBC/SQLJ Driver for OS/390 and z/OS is no longer supported. All Java application programs and Java routines that are currently written to work with the JDBC/SQLJ Driver for OS/390 and z/OS need to be modified to work with the IBM Data Server Driver for JDBC and SQLJ (formerly known as the DB2 Universal JDBC Driver).

All WLM-managed stored procedures address spaces that are set up to execute Java routines must be modified to reference the IBM Data Server Driver for JDBC and SQLJ. Existing WLM environments that are configured to use the JDBC driver fail when the address space initializes. Data sharing groups that have Version 8 or DB2 9 members in coexistence with members in DB2 10 conversion mode (from Version 8 or Version 9) fail if a Java routine is invoked on any DB2 10 members where the WLM-SPAS JCL does not reference the IBM Data Server Driver for JDBC and SQLJ.

**Recommendation:** Before you migrate to DB2 10, modify your WLM-SPAS JCL to use the IBM Data Server Driver for JDBC and SQLJ.

## Creation of simple table spaces (starting in DB2 9)

Simple table spaces that were created in previous releases can still be read and updated. However, you can no longer create simple table spaces. Because DB2 does not support creating new table spaces in DB2 10, it is possible to accidentally drop a simple table space that you cannot recover.

**Recommendation:** To avoid accidentally dropping a simple table space that you cannot recover, complete one of the following tasks before you migrate to DB2 10:

- Issue an ALTER TABLE ... ADD RESTRICT ON DROP statement against tables that are in a simple table space to restrict dropping these simple table spaces.
- Convert your simple table spaces.

## Connections from VAX machines and the PASCAL L string data type (starting in DB2 9)

For DRDA connections to DB2 for z/OS, the following items are no longer supported:

- Connections from VAX machines
- The PASCAL L string data type

## **AIV Extender, Text Extender, and Net Search Extender (starting in DB2 9)**

AIV Extender, Text Extender, and Net Search Extender have been removed. DB2 10 incorporates substantial text function into the base product. Use the new functions and indexing for text applications.

## **Net.Data® (starting in DB2 9)**

Net.Data has been removed. WebSphere® is the strategic IBM solution for delivering DB2 data to web applications.

## **QMF Visionary Studio program (starting in DB2 9)**

The QMF Visionary Studio program has been removed from QMF Enterprise Edition.

## **DB2 Estimator (starting in DB2 9)**

DB2 Estimator, which was available for download from the web for DB2 Version 8, is not provided for DB2 10.

## **Visual Explain for DB2 for z/OS (starting in DB2 9)**

Visual Explain for DB2 for z/OS, which was available for download from the web for DB2 Version 8, is not provided for DB2 10. Instead, IBM Data Studio for DB2 for z/OS, part of the IBM DB2 Accessories Suite for z/OS, extends the capability of Visual Explain and adds more SQL tuning functions. IBM Data Studio works with both DB2 Version 8 and DB2 10.

## **DB2 XML Extender**

DB2 XML Extender is no longer supported. In DB2 10, you can use the XML data type instead.

## **DB2 Management Clients feature**

DB2 Management Clients feature, which includes DB2 Administration Server, DB2 Control Center, and DB2 Development Center, is no longer supported. Instead, use IBM Data Studio to design, develop, deploy, and manage your data-driven applications.

## **Several subsystem parameters**

The DBPROTCL subsystem parameter is no longer supported. The default for the DBPROTOCOL bind option is DRDA. You can still specify DBPROTOCOL(PRIVATE) explicitly when binding packages and plans, but DB2 issues a warning message if you perform any bind with this value.

The following subsystem parameters have been removed:

- EDMBFIT
- HOPAUTH
- LOGAPSTG
- MAX\_OPT\_ELAP
- MAX\_UTIL\_PARTS

- MORE\_UNION\_DISTRIBUTION
- OPTIXOPREF
- PARTKEYU
- RELCURHL

In DB2 10, the option to hold a lock after commit is eliminated. DB2 always releases the page or row lock for cursor hold at commit, which allows for greater concurrency.

- SJMISSKY
- STORPROC
- SUPPRESS\_TS\_CONV\_WARNING
- TABLES\_JOINED\_THRESHOLD

DB2 10 always operates as if SUPPRESS\_TS\_CONV\_WARNING=NO.

### Some supplied routines

The following supplied routines are removed in DB2 10 and are unavailable to callers after migration to conversion mode (from Version 8 or Version 9). A report is added to the DSNTIJPB premigration job to detect occurrences of these routines on an existing subsystem or data sharing group, and to specify that these routines are not available in Version 10.

- DSN8.DSN8EXP
- AMI-based DB2 MQ functions
  - DB2MQ1C.GETCOL
  - DB2MQ1C.MQPUBLISH
  - DB2MQ1C.MQREAD
  - DB2MQ1C.MQREADALL
  - DB2MQ1C.MQREADALLCLOB
  - DB2MQ1C.MQREADCLOB
  - DB2MQ1C.MQRECEIVE
  - DB2MQ1C.MQRECEIVEALL
  - DB2MQ1C.MQRECEIVEALLCLOB
  - DB2MQ1C.MQRECEIVECLOB
  - DB2MQ1C.MQSEND
  - DB2MQ1C.MQSUBSCRIBE
  - DB2MQ1C.MQUNSUBSCRIBE
  - DB2MQ2C.GETCOL
  - DB2MQ2C.MQPUBLISH
  - DB2MQ2C.MQREAD
  - DB2MQ2C.MQREADALL
  - DB2MQ2C.MQREADALLCLOB
  - DB2MQ2C.MQREADCLOB
  - DB2MQ2C.MQRECEIVE
  - DB2MQ2C.MQRECEIVEALL
  - DB2MQ2C.MQRECEIVEALLCLOB
  - DB2MQ2C.MQRECEIVECLOB
  - DB2MQ2C.MQSEND
  - DB2MQ2C.MQSUBSCRIBE

- | – DB2MQ2C.MQUNSUBSCRIBE
- | – DB2MQ1N.GETCOL
- | – DB2MQ1N.MQPUBLISH
- | – DB2MQ1N.MQREAD
- | – DB2MQ1N.MQREADALL
- | – DB2MQ1N.MQREADALLCLOB
- | – DB2MQ1N.MQREADCLOB
- | – DB2MQ1N.MQRECEIVE
- | – DB2MQ1N.MQRECEIVEALL
- | – DB2MQ1N.MQRECEIVEALLCLOB
- | – DB2MQ1N.MQRECEIVECLOB
- | – DB2MQ1N.MQSEND
- | – DB2MQ1N.MQSUBSCRIBE
- | – DB2MQ1N.MQUNSUBSCRIBE
- | – DB2MQ2N.GETCOL
- | – DB2MQ2N.MQPUBLISH
- | – DB2MQ2N.MQREAD
- | – DB2MQ2N.MQREADALL
- | – DB2MQ2N.MQREADALLCLOB
- | – DB2MQ2N.MQREADCLOB
- | – DB2MQ2N.MQRECEIVE
- | – DB2MQ2N.MQRECEIVEALL
- | – DB2MQ2N.MQRECEIVEALLCLOB
- | – DB2MQ2N.MQRECEIVECLOB
- | – DB2MQ2N.MQSEND
- | – DB2MQ2N.MQSUBSCRIBE
- | – DB2MQ2N.MQUNSUBSCRIBE
- | • MQSeries® publish and subscribe XML routines
- | – DB2MQ1C.PUBLISHXML
- | – DB2MQ2C.PUBLISHXML
- | • MQSeries XML routines
- | – DMQXML1C.DXXMQGEN
- | – DMQXML1C.DXXMQGENCLOB
- | – DMQXML1C.DXXMQINSERT
- | – DMQXML1C.DXXMQINSERTALL
- | – DMQXML1C.DXXMQINSERTALLCLOB
- | – DMQXML1C.DXXMQINSERTCLOB
- | – DMQXML1C.DXXMQRETRIEVE
- | – DMQXML1C.DXXMQRETRIEVECLOB
- | – DMQXML1C.DXXMQSHRED
- | – DMQXML1C.DXXMQSHREDALL
- | – DMQXML1C.DXXMQSHREDALLCLOB
- | – DMQXML1C.DXXMQSHREDCLOB
- | – DMQXML1C.MQPUBLISHXML
- | – DMQXML1C.MQRCVALLXMLCLOB



- | - DMQXML1C.MQREADALLXML
- | - DMQXML1C.MQREADALLXMLCLOB
- | - DMQXML1C.MQREADXML
- | - DMQXML1C.MQREADXMLCLOB
- | - DMQXML1C.MQRECEIVEALLXML
- | - DMQXML1C.MQRECEIVEXML
- | - DMQXML1C.MQRECEIVEXMLCLOB
- | - DMQXML1C.MQSENDXML
- | - DMQXML1C.MQSENDXMLFILE
- | - DMQXML1C.MQSENDXMLFILECLOB
- | - DMQXML2C.DXXMQGEN
- | - DMQXML2C.DXXMQGENCLOB
- | - DMQXML2C.DXXMQINSERT
- | - DMQXML2C.DXXMQINSERTALL
- | - DMQXML2C.DXXMQINSERTALLCLOB
- | - DMQXML2C.DXXMQINSERTCLOB
- | - DMQXML2C.DXXMQRETRIEVE
- | - DMQXML2C.DXXMQRETRIEVECLOB
- | - DMQXML2C.DXXMQSHRED
- | - DMQXML2C.DXXMQSHREDALL
- | - DMQXML2C.DXXMQSHREDALLCLOB
- | - DMQXML2C.DXXMQSHREDCLOB
- | - DMQXML2C.MQPUBLISHXML
- | - DMQXML2C.MQRCVALLXMLCLOB
- | - DMQXML2C.MQREADALLXML
- | - DMQXML2C.MQREADALLXMLCLOB
- | - DMQXML2C.MQREADXML
- | - DMQXML2C.MQREADXMLCLOB
- | - DMQXML2C.MQRECEIVEALLXML
- | - DMQXML2C.MQRECEIVEXML
- | - DMQXML2C.MQRECEIVEXMLCLOB
- | - DMQXML2C.MQSENDXML
- | - DMQXML2C.MQSENDXMLFILE
- | - DMQXML2C.MQSENDXMLFILECLOB

### **EXPLAIN tables in pre-DB2 Version 8 format and EXPLAIN tables in EBCDIC encoding**

In DB2 10, EXPLAIN tables in a format earlier than DB2 Version 8 are no longer supported. Before migration to DB2 10, these tables must be converted to the format of the current (DB2 Version 8 or DB2 9) release. Starting in DB2 10 conversion mode (from either DB2 Version 8 or DB2 9), DB2 returns SQLCODE -20008 for statements or commands that invoke EXPLAIN processing if EXPLAIN tables are in a pre-Version 8 format.

Also in DB2 10, EXPLAIN tables that are encoded in EBCDIC are no longer supported. If an EXPLAIN table is in DB2 10 format and encoded in EBCDIC, SQLCODE -878 is returned. However, for transition purposes, EXPLAIN tables that

are in Version 8 or DB2 9 format can be encoded in EBCDIC. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or DB2 9 format, regardless of the encoding type. For more information about converting your EXPLAIN tables, see “Converting EXPLAIN tables (before migration)” on page 43.

### **Private protocol**

The private protocol remote data access method is no longer supported as of DB2 10. DRDA protocol must be used instead. Packages and plans that were bound with DBPROTOCOL(PRIVATE) in a previous release can exist in DB2 10 and might run in DB2 10. If an application that executes packages or plans that were bound with DBPROTOCOL(PRIVATE) only accesses objects that are local to the DB2 subsystem, the application should run successfully. If an application that executes packages that were bound with DBPROTOCOL(PRIVATE) accesses a remote location, the application fails.

### **REORG TABLESPACE SHRLEVEL NONE on LOB table spaces**

In DB2 10 new-function mode, running the REORG TABLESPACE utility with the SHRLEVEL NONE option on a LOB table space is no longer supported. If SHRLEVEL NONE is specified, the utility immediately completes with return code 0 without performing the reorganization. SHRLEVEL REFERENCE or SHRLEVEL CHANGE should be used instead.

### **INDEXES keyword for REPAIR**

The INDEXES keyword of the REPAIR utility is no longer supported. To repair all indexes, specify INDEX(ALL), followed by a *table-space-spec*.

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## **Changes that might affect your migration from DB2 9**

If you are migrating from DB2 9, be aware of the changes that might affect your migration.

Proper planning should alleviate any system inconveniences.

### **Availability of new functions in conversion mode from Version 9 and new-function mode**

In most cases, new functions are available only in new-function mode. However, optimization and virtual storage enhancements also work in conversion mode from Version 9.

The DB2 10 for z/OS information assumes that your DB2 subsystem is running in DB2 10 new-function mode. Generally, new functions that are described, including changes to existing functions, statements, and limits, are available only in new-function mode. The exceptions to this general statement are new and changed optimization enhancements, which are also available in conversion mode from Version 9 unless stated otherwise. Also, the convergence of the temporary database into the work file temporary database applies to conversion mode from Version 9.

If you migrate from DB2 9, you can use DB2 9 new-function mode functions in DB2 10 conversion mode from Version 9. Any functions that are available in conversion mode from Version 9 are also available in all other modes before new-function mode.

## Application and SQL release incompatibilities for migration from DB2 9

When you migrate from DB2 9 to DB2 10, be aware of the application and SQL release incompatibilities.

### GUPI

Plan for the following changes in DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### Automatic rebind of plans and packages created before Version 6

If you have plans and packages that were bound before Version 6 and you specified YES or COEXIST in the AUTO BIND field of panel DSNTIPO, DB2 10 automatically binds these packages. Thus, you might experience an execution delay the first time that such a plan is loaded. Also, DB2 might change the access path due to the autobind, potentially resulting in a more efficient access path.

If you specify NO in the AUTO BIND field of panel DSNTIPO, DB2 10 returns SQLCODE -908, SQLSTATE 23510 for each attempt to use such a package or plan until it is rebound.

### IBMREQD is no longer reliable as a release dependency mark

The IBMREQD field in DB2 catalog tables is no longer a reliable indicator for determining release dependencies. Use the RELCREATED or RELBOUND fields instead.

### Changes to string formatting of decimal data Explanation

DB2 10 changed the formatting of decimal data by the CHAR and VARCHAR built-in functions and CAST specifications with a CHAR or VARCHAR result type. For input data that contains decimals, leading zeros are removed, and leading zeros are not added to values that did not already contain leading zeros. If the scale of the decimal value is zero, the decimal character is not returned. Also, the CHAR function no longer returns leading blanks for positive decimal values. The result of the CHAR function for decimal data is now consistent with the result of CAST(*decimal-expression* AS CHAR).

After migration to DB2 10, packages that were bound before DB2 10 use the old behavior for these functions. Materialized query tables and indexes on expressions that were created before DB2 10 also continue to use the old behavior.

Views and inline SQL functions use the behavior of the SQL statement that references the object. It is possible for references to the same view or function in different applications to get different behavior for these functions or casts.

### Possible impact to your DB2 environment

These changes might cause unexpected output from applications that use the CHAR or VARCHAR functions for decimal data or the CAST(*decimal-expression* AS

CHAR) or CAST(*decimal-expression* AS VARCHAR) specifications.

## Actions to take

These changes occur in DB2 10 conversion mode (from both Version 8 and Version 9). You can temporarily override these changes on a subsystem level by using the BIF\_COMPATIBILITY subsystem parameter. You can also temporarily override these changes on an application level by adding schema SYSCOMPAT\_V9 to the front of the PATH bind option or CURRENT PATH special register. This approach works for CHAR and VARCHAR functions and does not affect CAST specifications. The recommended approach is to modify your applications to handle the DB2 10 behavior for these functions, as described in the following steps.

To modify your applications to handle the DB2 10 behavior for CHAR, VARCHAR, and CAST:

1. Identify applications that need to be modified to handle this change. You can use IFCID trace 0366 to identify affected applications.
2. Ensure that the BIF\_COMPATIBILITY subsystem parameter is set to V9\_DECIMAL\_VARCHAR.  
To handle the change for the CHAR function only, you can set the subsystem parameter to V9 and complete the following steps for the CHAR function.
3. Change any affected applications to handle the new DB2 10 CHAR and VARCHAR behavior, including stored procedures, non-inline user-defined functions, and trigger packages. Rewrite affected CAST specifications with the appropriate CHAR or VARCHAR function and a CAST to the correct length if needed.
4. Rebind and prepare packages with the PATH(SYSCURRENT,SYSSIB) rebind option to use the new DB2 10 CHAR and VARCHAR built-in functions. Repeat this step for native stored procedures (SQLPL) and non-inline SQL scalar functions.
5. For views that reference these casts or built-in functions, determine whether the view needs to be changed to have the expected output. Drop and re-create the views with the PATH(SYSCURRENT,SYSSIB) rebind option only if necessary. Rebind any applications that reference the views with the PATH(SYSCURRENT,SYSSIB) option to use the new DB2 10 CHAR and VARCHAR built-in functions. Repeat this step for inline SQL scalar functions.
6. For materialized query tables or indexes on expressions that reference these casts or built-in functions, drop and re-create the materialized query tables or indexes on expressions with the PATH(SYSCURRENT,SYSSIB) rebind option. Issue the REFRESH TABLE statement for materialized query tables. Rebind any applications that reference the materialized query tables or indexes on expressions with the PATH(SYSCURRENT,SYSSIB) option to use the new DB2 10 CHAR and VARCHAR built-in functions.
7. Change the value of the BIF\_COMPATIBILITY subsystem parameter to CURRENT. When the subsystem parameter value is CURRENT, new applications, rebinds, and CREATE statements use the new CHAR, VARCHAR, and CAST behavior.

Materialized query tables and indexes on expressions use the CHAR, VARCHAR, and CAST behavior that is specified during its creation. If a reference statement has a different behavior that is specified by the BIF\_COMPATIBILITY parameter or a different path, the materialized query table or expression-based index is not used.

**Related reference:**

“BIF COMPATIBILITY field (BIF\_COMPATIBILITY subsystem parameter)” on page 454

### **Change to maximum result length of VARCHAR function**

In DB2 10, the maximum result length of the VARCHAR function is changed from 32767 to the maximum length of a VARCHAR.

### **Changes to VARCHAR\_FORMAT function length attribute**

In DB2 10, for VARCHAR\_FORMAT functions, the length attribute of the result is the length attribute of the format string, up to a maximum of 255. To apply this change, use the following guidance:

- Existing view definitions that reference the VARCHAR\_FORMAT function should be regenerated with an ALTER VIEW statement.
- Existing materialized query statements that reference the VARCHAR\_FORMAT function should be dropped and re-created.
- Bound SQL statements that reference the VARCHAR\_FORMAT function will only use the new behavior when they have been bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- DESCRIBE statements will only determine the result data type for the VARCHAR\_FORMAT function using the modified rules in the DESCRIBE statements have been bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- Existing indexes that involve an expression that reference the VARCHAR\_FORMAT function should be dropped and re-created.

If an application is using the DSNTIAUL program, the result string is padded with characters '00'X. Consider this incompatible change for any applications that use the VARCHAR\_FORMAT function and are dependent on the output from DSNTIAUL.

### **New format element for VARCHAR\_FORMAT function**

In DB2 10, a new format element, “RRRR”, is supported. In previous versions, this format element was interpreted as two adjacent specifications of the “RR” format element.

### **Change to result of VARCHAR\_FORMAT function with “HH12” format element**

In DB2 10, if the “HH12” format element is specified in a VARCHAR\_FORMAT function and the time component of the first argument is 24:00:00, the input timestamp value is adjusted to 00:00:00 and the date is changed to the next day. In previous releases, the timestamp value is adjusted to 12:00:00 and the day is not changed.

### **Change to result of VARCHAR\_FORMAT function with “J” format element**

In DB2 10, if the “J” format element is specified in a VARCHAR\_FORMAT function, the result is different from the result of the JULIAN\_DAY function for dates earlier than October 15, 1582.

### **New supported data types for VARCHAR\_FORMAT function**

The VARCHAR\_FORMAT function has been extended to allow date, character, and graphic string input for the first argument, and graphic string input for the second argument. If the function is invoked with one of the newly supported data types, and an existing user-defined function named VARCHAR\_FORMAT also supports the data type, the function might resolve to the built-in function rather than the

| user-defined function. If the reference to the existing function uses the unqualified  
| name and SYSIBM precedes the schema that was used for the user-defined  
| function, the new function will be invoked rather than the user-defined function.

### **Change to maximum result length of REPEAT function**

| In DB2 10, the maximum result length of the REPEAT function is changed from  
| 32767 to the maximum length of a VARCHAR.

### **Change to maximum result length of XMLTABLE function**

| In DB2 10, the maximum length of a VARCHAR data type result column of the  
| XMLTABLE function is changed from 32767 to the maximum length of a  
| VARCHAR.

### **Change to how a positive, signed integer in an ORDER BY clause is treated**

#### **Explanation**

| Beginning in DB2 10 conversion mode (from both Version 8 and Version 9), a  
| positive, signed integer in an ORDER BY clause is treated as a *sort-key-expression*.  
| Such integers were previously interpreted as column numbers.

| For example, in previous versions, ORDER BY +1 in the following SELECT  
| statement meant order by column 1 (C1).

| SELECT C1, C2 FROM T1 ORDER BY +1;

| Starting in DB2 10, +1 means the constant +1, which has no effect on the order of  
| the rows.


#### **Possible impact to your DB2 environment**

| This change might cause unexpected results of queries that contain an ORDER BY  
| clause with a positive, signed integer. However, no error is issued when such  
| queries are run.

#### **Actions to take**

| To prepare for this change, identify any queries that use a positive, signed integer  
| in an ORDER BY clause to refer to a column in the result table. Modify these  
| queries to use unsigned integers to identify column numbers.

#### **Related reference:**

|  [order-by-clause \(DB2 SQL\)](#)

### **Binding DBRMs directly into plans is no longer supported**

| For pre-existing plans that are bound from DBRMs, you can use the COLLID  
| parameter of the REBIND PLAN command to create packages. If you execute a  
| plan that is bound from DBRMs, DB2 performs an automatic rebind that creates  
| packages from the DBRMs and binds those packages into a plan. However, it is  
| recommended that you run REBIND PLAN with the COLLID option so that you  
| can specify bind options and receive more diagnostic information.

| **Important:** If the same DBRM is in multiple plans, and you run REBIND PLAN  
| with the same COLLID option value on more than one of those plans, DB2  
| overlays the previously created package in the collection each time you run  
| REBIND with COLLID. To avoid overlaying packages, specify a different COLLID  
| value for each plan that contains DBRMs that are also in other plans.

If the installation uses the RACF access control module, owners of plans with DBRMs need to explicitly rebind the plans to convert the DBRMs to packages.

For more information on developing a strategy for converting your plans to include only packages, see Conversion to packages (DB2 9 for z/OS: Packages Revisited).

### **Some BIND PLAN and REBIND PLAN command options are no longer supported**

The ACQUIRE(ALLOCATE) option of the BIND PLAN and REBIND PLAN commands is no longer supported. If you specify ACQUIRE(ALLOCATE), DB2 issues a warning message and uses ACQUIRE(USE).

Also, the MEMBER option of BIND PLAN and REBIND PLAN is no longer supported. If you specify MEMBER, DB2 issues a warning message, binds the specified DBRM into a package, and binds the package into a plan.

### **Plans and packages should be converted to DRDA protocol**

Plans and packages that were previously bound using DBPROTOCOL(PRIVATE) should be converted to DRDA protocol before migration to DB2 10. In DB2 10, plans and packages that were bound with the DBPROTOCOL(PRIVATE) bind option and access remote locations cannot run. Applications that use packages or plans that were bound with DBPROTOCOL(PRIVATE) and access remote locations fail with SQLCODE -904. A rebind of those plans and packages must be explicitly performed before they can execute successfully. Job DSNTIJPM identifies the objects that must be converted to use DRDA protocol.

### **Change to GRANT statement**

The PUBLIC AT ALL LOCATIONS clause is no longer allowed in the GRANT statement for table and view privileges as an alternative to PUBLIC. The DSNTPPCK program in Version 8 and DB2 9 analyzes the embedded SQL statements in packages and plans for private protocol SQL, which is invalid in DB2 10. The program produces a report that states which packages and member DBRMs of plans contain the invalid syntax. The program scans either the SYSIBM.SYSSTMT catalog table, the SYSIBM.SYSPACKSTMT catalog table, or both. Applications that issue dynamic SQL statements with the invalid PUBLIC AT ALL LOCATIONS clause will receive SQLCODE -199.

### **Change to IMMEDIATE option of BIND PACKAGE command**

In DB2 10, if IMMEDIATE is not specified on a BIND PACKAGE command, the default is "I", or INHERITFROMPLAN. In previous versions, the default was NO.

### **Changes to conversion of special characters in collection IDs and package names**

In DB2 10, DRDA character type parameter data is sent between client drivers and DB2 in UTF-8 Unicode, if those client drivers also have this support. Character type parameter data includes package names and collection IDs. Prior to DB2 10, collection IDs and package names were sent in EBCDIC, and then converted to Unicode before being stored in the DB2 catalog. A collection ID or package name that is in the DB2 catalog from a bind that was initiated by an older driver might not match an ID or name that is sent to DB2 by a newer driver. This mismatch, which is caused by the way that some special characters are converted, can cause package-not-found errors. Job step DSNTGEN of job DSNTIJPM identifies package names and collection IDs that contain special characters that cause mismatches. From the upgraded client drivers, those packages need to be bound with the ACTION(REPLACE) option.

## Changes to the RELEASE bind option

In releases prior to DB2 10, the RELEASE bind option had no effect on database access threads. Starting in DB2 10, by default, DB2 honors the RELEASE bind option for database access threads. You can modify this behavior by using the new MODIFY DDF PKGREL command.

## Database metadata stored procedures are converted to Unicode

In DB2 10, supplied database metadata stored procedures are encoded in Unicode. The DB2 10 migration process redefines the stored procedures to use the following new load modules:

Table 16. Metadata stored procedures and associated load modules

Stored procedure	Load module
SYSIBM.SQLCOLPRIVILEGES	DSNACPRU
SYSIBM.SQLCOLUMNS	DSNACOLU
SYSIBM.SQLFOREIGNKEYS	DSNAFNKU
SYSIBM.SQLFUNCTIONCOLS	DSNAFCOU
SYSIBM.SQLFUNCTIONS	DSNAFUNU
SYSIBM.SQLGETTYPEINFO	DSNATYPU
SYSIBM.SQLPRIMARYKEYS	DSNAPRKU
SYSIBM.SQLPROCEDURECOLS	DSNAPCOU
SYSIBM.SQLPROCEDURES	DSNAPRCU
SYSIBM.SQLSPECIALCOLUMNS	DSNASPCU
SYSIBM.SQLSTATISTICS	DSNASTAU
SYSIBM.SQLTABLEPRIVILEGES	DSNATBPU
SYSIBM.SQLTABLES	DSNATBLU
SYSIBM.SQLUPTS	DSNAUDTU

Some applications call the database metadata stored procedures to retrieve double-byte (DBCS) data. Those applications must be modified to use Unicode if they are bound on a DB2 server that has an EBCDIC SBCS CCSID, and the MIXED parameter is set to NO in the application defaults load module, *dsnhdec*.

## AUTHID is the default owner of packages that are bound by DSNTRIN

In previous releases, the stored procedures and user-defined functions that are provided as part of the DB2 base product (routine that supplied routines) were created and bound by processing inline DDL and bind statements in DSNTIJSG and other installation jobs. By default, the ID that was used to run the job was also the authorization ID for creating the routines and the default package owner for those routines.

In DB2 10, DB2-supplied routines are created and bound by running program DSNTRIN in job DSNTIJRT. The AUTHID parameter of DSNTRIN specifies the authorization ID for creating the routines. This ID is also the default owner of packages that are bound for those routines.

## New default DEFINE attribute for dependent objects

As of DB2 10, if the DEFINE attribute is not specified in the CREATE statement for explicitly created dependent objects (auxiliary indexes, XML indexes, and base table indexes), DB2 uses the DEFINE attribute of the base table space.



**Exception:** If the DEFINE attribute is not specified for explicitly created LOB table spaces, there is no correlation with the base table space until the auxiliary table is created. The DEFINE attribute is not inherited from the base, and the default is DEFINE YES.

Implicitly created dependent objects (base table indexes, LOB and XML table spaces, and their dependent indexes) inherit the DEFINE attribute of the base table space if it is DEFINE NO. Otherwise, if the base table space attribute is DEFINE YES, the value of the IMPDSDEF subsystem parameter is used for the dependent objects.

### **Change for creating partitioned table spaces**

To create a partitioned (non-universal) table space in DB2 10 new-function mode, you must specify SEGSIZE 0 and the Numparts keyword of the CREATE TABLESPACE statement. Before new-function mode, do not specify the SEGSIZE to create a partitioned table space.

### **Change to default for CREATE TABLESPACE statements**

In previous releases of DB2, if a CREATE TABLESPACE statement contains the Numparts clause but neither the MAXPARTITIONS clause nor the SEGSIZE clause, a partitioned (non-universal) table space is created. Beginning in DB2 10 new-function mode, the same statement results in a range-partitioned table space with a segment size of 32 by default. You might observe this difference when a subsequent CREATE INDEX statement with the specified ranges fails because index partitioning of a range-partitioned table space is not supported.

In response, you can change the default segment size through the DSN6SYSP.DPSEGSZ subsystem parameter, which is externalized as the DEFAULT PARTITION SEGSIZE field on panel DSNTIP7. The value of the DPSEGSZ parameter can range from 0 to 64 in increments of 4; for example, 0, 4, 8, and so on up to 64. The default is 32.

When DPSEGSZ is set to 0, a CREATE TABLESPACE statement that contains the Numparts clause but neither the MAXPARTITIONS clause nor the SEGSIZE clause results in a partitioned (non-universal) table space, which is the behavior of previous releases. Note that the DPSEGSZ parameter is provided for compatibility only. It is deprecated in DB2 10, and you should take steps to modify affected CREATE TABLESPACE statements or plan to use partition-by-growth table spaces instead of partitioned (non-universal) table spaces.

### **Change to default SEGSIZE value for universal table spaces**

In DB2 10, the default SEGSIZE value for universal table spaces has changed from 4 to 32.

### **Upgrade to supported COBOL and PL/I compilers**

If you use the DB2 10 precompiler, you must upgrade to COBOL compilers that DB2 10 supports. See the DB2 Program Directory for information about supported compilers. The generated SQLCA and SQLDA for COBOL have changed. The generated attribute for binary data items is now COMP-5 instead of COMP-4 or COMP. Applications that are compiled on compilers that do not support the COMP-5 attribute no longer work.

For some COBOL and PL/I compilers that are no longer supported, you can use a version of the precompiler that allows you to precompile applications that have dependencies on these unsupported compilers. You can use this version of the precompiler with the following unsupported compilers:

- OS/VS COBOL V1.2.4

- OS PL/I 1.5 (PL/I Opt. V1.5.1)
- VS/COBOL II V1R4
- OS PL/I 2.3

The load module for this precompiler is DSNHPC7. This precompiler is meant only to ease the transition from unsupported compilers to supported compilers. This precompiler has the following restrictions:

- There is no corresponding DB2 coprocessor function to match this precompiler.
- The precompiler does not support SQL procedures.
- Only COBOL and PL/I are supported.
- The SQL flagger is not supported.
- The precompiler produces DB2 Version 7 DBRMs, and does not support any capability that is newer than DB2 Version 7.
- The application defaults module must be named DSNHDECP.

Support of this precompiler is deprecated in DB2 10.

### **GRAPHIC and NOGRAPHIC SQL processing options are removed**

If you specify the SQL processing options GRAPHIC or NOGRAPHIC, DB2 issues a standard warning message about an invalid option. These options are superseded by the CCSID SQL processing option.

### **SELECT FROM data change statements in BEFORE triggers no longer supported**

The following statements are no longer allowed in the body of a BEFORE trigger:

- SELECT FROM DELETE
- SELECT FROM INSERT
- SELECT FROM MERGE
- SELECT FROM UPDATE

### **RETURN statement in scalar functions must follow *option-list***

In previous DB2 versions, RETURN statements in scalar functions could be in any order, relative to other clauses. After migration to DB2 10 conversion mode (from Version 8 or Version 9), the RETURN statement in CREATE FUNCTION or ALTER FUNCTION statements must follow *option-list*. If a RETURN statement precedes *option-list* in one of these statements, DB2 issues SQLCODE -199.

### **Changed behavior of LOCATE\_IN\_STRING function**

In DB2 10, a negative value for *start* in the LOCATE\_IN\_STRING function results in the search starting at the end of the source string. When *start* is negative, the starting position is  $\text{LENGTH}(\text{source-string}) + \text{start} + 1$ .

### **Changes to ROUND\_TIMESTAMP and TRUNC\_TIMESTAMP functions**

In DB2 10, the ROUND\_TIMESTAMP and TRUNC\_TIMESTAMP functions return the first day of the first ISO week of the ISO year when an ISO year format is specified.

Also, whenever a CC or SCC format is specified, a start of a century is considered to be year 01.

## Changes to result of NEXT\_DAY function

In DB2 10, the result data type for the NEXT\_DAY function is determined from the input data. If the first input argument is a string, the result is TIMESTAMP(6) WITHOUT TIME ZONE. Otherwise, the data type of the result is the same as the data type of the first input argument. For example, if the input is a date data type, the result is also a date data type. The following rules apply to the change in the NEXT\_DAY function:

- Existing view definitions that reference the NEXT\_DAY function should be regenerated with an ALTER VIEW statement.
- Existing materialized query statements that reference the NEXT\_DAY function should be dropped and re-created.
- Bound SQL statements that reference the NEXT\_DAY function only use the modified rules to determine the result data type if the statements are bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- DESCRIBE statements only use the modified rules to determine the result data type for the NEXT\_DAY function if the statements are bound in DB2 10 conversion mode (from Version 8 or Version 9) or later.
- Existing indexes that involve an expression that reference the NEXT\_DAY function should be dropped and re-created.

## Changes to MONTHS\_BETWEEN function

In previous releases, the MONTHS\_BETWEEN function ignored the time portion of arguments. In DB2 10, the MONTHS\_BETWEEN function takes the time portion of arguments into consideration.

## Changes to TIMESTAMPDIFF function

In previous releases, the TIMESTAMPDIFF function allowed string input values that had more than six digits to the right of the decimal point. In DB2 10, an error is issued if the string input value for TIMESTAMPDIFF function has more than six digits to the right of the decimal point.

## Static SQL applications that use parallelism

DB2 incrementally rebinds the statements that use parallelism after migration to DB2 10. Incremental rebinds can cause performance degradation. If you use the access control authorization exit (DSNX@XAC) for authorization, incremental rebinds can cause authorization failures because they trigger authorization checks of static SQL statements when the package is executed. The authorization checks are performed on the primary authorization ID during incremental rebinds.

You should manually rebind those statements that use parallelism after migration. You can run a query in job DSNTIIPM before you migrate to determine which statements can use parallelism, and are therefore candidates for incremental rebinds. You should consider rebinding those statements after migration, as soon as your DB2 10 system is stable. After you migrate to DB2 10, you can also run a performance trace, class 3 or class 10 for IFCID 360, to identify the plans and packages that contain static SQL queries that use parallelism, and therefore need to be rebound.

## Enforced SELECT authorization checking for UPDATE and DELETE statements

DB2 10 checks for the SELECT privilege or appropriate administrative privilege before allowing a user to execute UPDATE or DELETE statements that reference an existing value in the target table. This authorization checking applies regardless of how the statements are executed (for example, bound in a package or executed in a dynamic statement). The authorization now also applies regardless of the setting

of the SQLRULES(STD) bind option for static statements or the CURRENT RULES special register for dynamic statements. If the user does not have the necessary SELECT authorization or administrative privilege, a negative SQLCODE is returned.

### **Increased limit for work file record length**

In DB2 10 new-function mode, the limit for the row length in the result of a JOIN or the row length of a SORT record is increased from 32 767 bytes (1 page) to 65 529 bytes. The sort key maximum length is also increased from 16 000 bytes to 32 000 bytes. Applications that exceed the old limits fail in conversion mode (from both Version 8 and Version 9) with SQLCODE -670 or SQLCODE -136.

### **New restrictions for EXPLAIN tables**

In DB2 10 conversion mode (from both Version 8 and Version 9), EXPLAIN tables must be in Version 8 or later format and preferably encoded in Unicode. When EXPLAIN tables are in a format prior to the Version 8 format, DB2 returns SQLCODE -20008 reason code 2 for statements or commands that invoke EXPLAIN processing. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or DB2 9 format, regardless of the encoding type. If an EXPLAIN table is in Version 10 format and encoded in EBCDIC, SQLCODE -878 is returned. When you convert EXPLAIN tables to Unicode encoding, applications that join with EXPLAIN tables might have different results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide).

**Recommendation:** Before you begin migration to DB2 10, convert all EXPLAIN tables to the current version (8 or 9.1) format and Unicode encoding, and then check for joins to those tables. You can use job DSNTIJXA to convert most tables to current release format. You can use jobs DSNTIJXB and DSNTIJXC to migrate EBCDIC-encoded EXPLAIN tables to Unicode.

### **MEMBER CLUSTER table spaces indicated by MEMBER\_CLUSTER column**

In previous versions of DB2, a “K” or “I” in the TYPE column of the SYSTABLESPACE catalog table indicated that the table space had MEMBER CLUSTER structure. In Version 10, a new MEMBER\_CLUSTER column on the SYSTABLESPACE catalog table is populated during the enabling-new-function mode (from both Version 8 and Version 9) migration process. For existing MEMBER CLUSTER table spaces, values of “K” in the TYPE column of SYSTABLESPACE are replaced with “L”, and values of “I” are replaced with blank. The MEMBER\_CLUSTER column is populated with “Y”. After migration to enabling-new-function mode (from Version 8 or Version 9), applications that query “K” or “I” in the TYPE column must query the new MEMBER\_CLUSTER column instead.

### **Changed values for the modification level in the product signature**

The DB2 10 product signature has the form DSN1001*m*, where *m* is the modification level. Values 0 and 1 are reserved for maintenance levels in conversion mode from Version 8, conversion mode\* from Version 8, enabling-new-function mode from Version 8, and enabling-new-function mode\* from Version 8. Values 2 and 3 are for maintenance levels in conversion mode from Version 9, conversion mode\* from Version 9, enabling-new-function mode from Version 9, and enabling-new-function mode\* from Version 9. Values 5, 6, 7, 8, and 9 are for maintenance levels in new-function mode. Value 4 is undefined.

## Changed behavior for the CREATE FUNCTION statement

In all forms of the CREATE FUNCTION statement, a parameter list is required. Functions without parameters must have empty parentheses specified, as in the following example: CREATE FUNCTION F1 ( ) RETURNS INT RETURN 1.

In previous releases, if you specified CREATE FUNCTION without a parameter list (for example, CREATE FUNCTION F1 RETURNS INT RETURN 1), you received no errors. In DB2 10, if you specify CREATE FUNCTION without a parameter list, DB2 issues an error.

Also, a CREATE FUNCTION statement for a non-inline SQL scalar function cannot have a parameter that is a distinct type that is based on a LOB data type. The inline SQL scalar functions have supported, and will continue to support, distinct type parameters where the underlying base data type is a LOB. For the syntax of this statement, see CREATE FUNCTION in the DB2 for z/OS SQL Reference Guide.

## Different SQLSTATE returned for some DELETE or UPDATE statements

In previous releases of DB2, a SQLSTATE value of "00000" was returned for some DELETE or UPDATE statements that did not contain a WHERE clause, when SQLWARN flags were set. Those situations occurred during bind processing. As of DB2 10, a SQLSTATE value of "01504" is returned in those situations. This change does not affect SQL statements that are executed on behalf of a DB2 for z/OS requester.

## Changed default behavior of multiple-row inserts for ODBC z/OS applications

As of DB2 10, the default behavior for multiple-row inserts is changed from non-atomic to atomic. To change the default behavior back to non-atomic, set keyword PARAMOPTATOMIC = 0 in the data source section of the ODBC initialization file.

## Changes to ALTER TABLESPACE statement error codes

Before DB2 10 conversion mode (from Version 8 or Version 9), if you execute an ALTER TABLESPACE MAXPARTITIONS statement on catalog objects, DB2 issues SQLCODE -644. After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), DB2 issues SQLCODE -607.

Also before DB2 10 conversion mode (from Version 8 or Version 9), if you execute an ALTER TABLESPACE MAXPARTITIONS statement with a value of MAXPARTITIONS that is invalid with the page size and DSSIZE values, DB2 issues SQLCODE -4701. After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), DB2 issues SQLCODE -644.

## Change to CREATE and ALTER statements

CREATE and ALTER statements for native SQL procedures no longer support the DEFAULT keyword for the SQL PATH option.

## Change to ALTER PROCEDURE statement

When the REGENERATE option is specified for the ALTER PROCEDURE statement for native SQL procedure, any existing comment in the catalog for the routine is retained. In previous DB2 versions, the comment was cleared in this situation.

## Change to DESCRIBE statement

In DB2 10, when a DESCRIBE statement is used on a result table that includes a distinct type, it will now return information about the distinct type.

## New restrictions on using DSNTIAUL

DSNTIAUL can no longer be used to process CREATE FUNCTION (SQL scalar) statements that would result in a package or CREATE TRIGGER statements. DSNTIAUL also cannot be used to process any other statement that contains *SQL-routine-body*. These statements are CREATE PROCEDURE (SQL external), CREATE PROCEDURE (SQL native), CREATE FUNCTION (SQL table), ALTER PROCEDURE (SQL native) with an ADD or REPLACE clause, and ALTER FUNCTION (SQL scalar) with an ADD or REPLACE clause.

## Changes to SYSROUTINES

As of DB2 10, the CREATEDTS column of SYSIBM.SYSROUTINES will always reflect the time that a CREATE statement was first issued for a routine. In previous releases of DB2, the CREATEDTS column might have contained different values if multiple versions of a routine were created.

## Catalog restructured

In DB2 10, the DB2 catalog is restructured to reduce lock contention. As a result, binding takes longer in DB2 10 than it did in previous versions. Also, execution of the DECLARE GLOBAL TEMPORARY TABLE statement takes longer in DB2 10.

## Changed data type for an untyped parameter marker

In previous releases, an untyped parameter marker for a unary minus operator has an assumed DOUBLE data type. In DB2 10, the assumed data type is DECFLOAT(34).

## Changes to handling of special values Infinity, sNaN, and NaN

In previous releases, when DB2 returns a decimal floating-point (DECFLOAT) value for Infinity, NaN, or sNaN as a CHAR or VARCHAR string, the string is in mixed case. In DB2 10, the values are returned in upper case as follows: INFINITY, NAN, or SNAN.

## Changes for INSTEAD OF triggers

Changes are introduced for existing INSTEAD OF triggers that were defined on a view that has a ROWID column or a column that is based on an underlying column of any of the following types:

- A security label column.
- A row change timestamp column.
- A column that is defined with AS ROW BEGIN.
- A column that is defined with AS ROW END.
- A column that is defined with AS TRANSACTION START ID.

For such INSTEAD OF triggers, the following actions now fail with a negative SQLCODE:

- Rebinding the INSTEAD OF trigger package.
- Dropping and re-creating the INSTEAD OF trigger.
- Running the REPAIR DBD utility on a database that includes the INSTEAD OF trigger.
- Issuing ALTER TABLE ALTER COLUMN SET DATA type on a table that has a view on which the INSTEAD OF trigger is defined.

## Change to positioned update or delete statements

### Explanation

In DB2 10, packages must be rebound if both of the following statements are true:

- The package contains static cursors that were bound in a previous version.
- The package contains dynamic UPDATE or DELETE statements that contain the WHERE CURRENT of clause. The WHERE CURRENT of clause indicates a positioned UPDATE or DELETE statement.

### Possible impact to your DB2 environment

If any such packages are not rebound in DB2 10, positioned UPDATE and DELETE statements fail with SQLCODE -20249 when they run against a down-level cursor.

### Actions to take

After migration to DB2 10 conversion mode (from Version 8 or Version 9), rebound packages that contain static cursors with positioned UPDATE or DELETE statements.

## Change to stored procedure parameter values returned to non-Java clients

In previous releases, when a remote application calls a DB2 for z/OS stored procedure, the data types of the returned output data match the data types of the corresponding CALL statement arguments. Starting in DB2 10 conversion mode (from both Version 8 and Version 9), the data types of the returned output data match the data types of the parameters in the stored procedure definition. This change can cause conversion failures for some applications that use non-Java client drivers such as .NET to call stored procedures on DB2. To prepare for this change, modify the CALL requests of your non-Java client applications to specify argument types that conform to the semantics of the client driver. If you want to temporarily override the DB2 10 behavior, you can set the DDF\_COMPATIBILITY subsystem parameter to SP\_PARMS\_NJV.

The SP\_PARMS\_NJV option of the DDF\_COMPATIBILITY subsystem parameter is deprecated. Although the option is supported in DB2 10, it might be removed in a later release.

## Change to results of JDBC method PreparedStatement.setTimestamp

TIMESTAMP WITH TIME ZONE is first supported in DB2 10 new-function mode. Before DB2 10 new-function mode, if the value that is assigned to a column (the second parameter of PreparedStatement.setTimestamp) has the java.sql.Timestamp data type, and the column data type is not known, the IBM Data Server Driver for JDBC and SQLJ chooses TIMESTAMP as the target data type. However, starting with DB2 10 new-function mode, unless the value that is assigned to the column is 0001-01-01-00:00:00.000000 or 9999-12-31-23:59:59.999999, the driver chooses TIMESTAMP WITH TIME ZONE as the column data type. If the driver chooses the TIMESTAMP data type, and the column type is actually TIMESTAMP WITH TIME ZONE, the database manager sets the time zone in the target column using the value of the IMPLICIT\_TIMEZONE DECP value. This value might differ from the value that is inserted prior to Version 10 new-function mode.

To produce the same results before and after new-function mode when `PreparedStatement.setTimestamp` is executed, specify a `com.ibm.db2.jcc.DBTimestamp` value as the second parameter.

### **Change to behavior of comma operator in XQuery path expression**

Comma operators in XQuery path expressions result in SQLCODE -16031. In previous releases, comma operators in XQuery path expression predicates were interpreted as the and operator.

### **Change in how DB2 returns stored procedure output parameter data to remote clients**

When an application on a client system calls a stored procedure on a DB2 10 for z/OS server, DB2 now handles the output parameters differently. Previously, DB2 returned stored procedure output parameters that were formatted according to the SQL type of the corresponding argument in the CALL statement. DB2 10 now returns output parameters that are formatted according to the SQL type of the corresponding parameter in the stored procedure declaration. This new behavior provides improved performance at the server by avoiding unnecessary server data conversions. Also, this new behavior is consistent with the existing server behavior for the return of query and select output data and it is consistent with the behavior of other DB2 family servers. Therefore, it provides applications with a more consistent and predictable interface to DB2 10.

In general, for applications that conform to client standards, this change has no impact to the calling application. In some cases, however, application changes might be needed. To prepare for this change, examine your remote applications that call DB2 stored procedures. If necessary, modify the CALL statements in your remote applications to specify argument data types that match the data types of the parameters in the stored procedure definitions.

### **When the change in behavior occurs**

In general, the new behavior occurs after migration to DB2 10 conversion mode from Version 8 (CM8) or conversion mode from DB2 9 (CM9). However, the following exceptions apply:

- For applications using IBM Data Server Driver for JDBC and SQLJ type 4 connectivity to access a DB2 10 data sharing group in CM8 or CM9, where the `enableSysplexWLB` client property is set to true:  
In such a configuration, the change in behavior occurs when the data sharing group is migrated to DB2 10 new-function mode (NFM). As long as the data sharing group is in CM8 or CM9 to support coexistence, DB2 10 uses the old behavior. The old behavior is used because the IBM Data Server Driver for JDBC and SQLJ might be caching data descriptors for outputs from the server. When the `enableSysplexWLB` property is set to true, the old behavior is maintained to ensure that the cached client descriptors are valid regardless of which member of the data sharing group is accessed.  
To prepare for this change in behavior while DB2 10 is in CM8 or CM9 to support coexistence, test your applications with the `enableSysplexWLB` client property set to false. Or, test the applications against a stand-alone DB2 10 server, if such a system is available for testing. The new DB2 10 behavior will be used for each of those applications even though the DB2 data sharing group is in CM8 or CM9.
- For applications using the IBM Data Server Driver for JDBC and SQLJ or non-Java clients (such as .NET), DB2 9 or earlier:



In such a configuration, the change in behavior occurs, by default, after migration to DB2 10 CM8 or CM9. However, the change in behavior can be temporarily deferred. To temporarily override the DB2 10 behavior for returning stored procedure output parameter data to the IBM Data Server Driver for JDBC and SQLJ or non-Java clients only (such as .NET), set the DDF\_COMPATIBILITY subsystem parameter to SP\_PARAMS\_NJV. The SP\_PARAMS\_NJV option of the DDF\_COMPATIBILITY subsystem parameter is deprecated. Although the option is supported in DB2 10 , it will be removed in a later release of DB2. For more information about DDF\_COMPATIBILITY, see Subsystem parameters that are not on installation panels.

## Examples of application impacts

The following examples use the IBM Data Server Driver for JDBC and SQLJ and .NET. Other drivers might behave differently. Because DB2 10 no longer converts data types when returning stored procedure output parameter data, there might be similar impacts to applications for other data types that are not discussed in the examples. If the calling application specifies arguments that are different from the declared parameter types, then the mismatch between the argument and parameter data types is handled by the client system, according to the client's programming model and the client's capabilities. If the client performs data type conversions such as for numeric data, the result of the conversion performed by the client might differ from the result that was previously returned when the DB2 server performed the conversion.

**Example 1:** A stored procedure parameter is declared as an INTEGER data type, but the application CALL statement specifies a SMALLINT argument.

- Behavior before DB2 10: DB2 converts the INTEGER data and returns a 2-byte SMALLINT value, which maps to an Int16 .NET data type.
- New behavior in DB2 10: DB2 returns a 4-byte INTEGER value, which maps to an Int32 .NET data type.

**Sample application impact (.NET):** If the application uses an IBM Data Server .NET client, the stored procedure CALL statement now fails with an invalid conversion error because the Int16 and Int32 .NET data types are not compatible with each other. The application must be changed to specify an Int32 argument in the CALL statement as required by the .NET programming model. Applications that are coded with an Int32 argument and call stored procedures that have an INTEGER parameter require no change.

The .NET programming model enforces strong data typing. Thus, even though the argument type and the parameter type are compatible SQL types, the .NET driver enforces strong data type checking according to the .NET semantics. Refer to the .NET documentation for information about .NET strong type checking.

**Example 2:** A stored procedure parameter is declared as a REAL data type, but the application CALL statement specifies a DOUBLE argument.

- Behavior before DB2 10: DB2 converts the output data to a DOUBLE value before returning it to the client.
- New behavior in DB2 10: DB2 returns the data to the client as a REAL value.

**Sample application impact (Java):** If an application that uses the IBM Data Server Driver for JDBC and SQLJ uses the registerOutParameter() method to register the output parameter as a DOUBLE value before calling a stored procedure that has a

REAL parameter, the following behavior occurs if the Java application uses the getObject() method to retrieve the output value:

- Before Version DB2 10 , DB2 converted the REAL value to a DOUBLE value and returned it to the client. The IBM Data Server Driver for JDBC and SQLJ returned the DOUBLE value directly to the application as the result of the getObject() method.
- Beginning in DB2 10 , DB2 returns the REAL value to the client. The IBM Data Server Driver for JDBC and SQLJ converts the REAL value to a DOUBLE value and returns it to application as the result of the getObject() method. APAR IC80974 for LUW clients and APAR PM58951 (JCC 3.63.131) and PM58952 (JCC 4.13.136) for z/OS clients are required in the IBM Data Server Driver for JDBC and SQLJ to ensure that the conversion is completed by the getObject() method. If the APAR fix is not applied, the Java application gets a ClassCastException.

**Example 3:** A stored procedure parameter is declared as a TIMESTAMP data type, but the application CALL statement specifies a VARCHAR argument.

- Behavior before DB2 10: DB2 converts the fixed-length TIMESTAMP data and returns a 26-byte VARCHAR value, containing a TIMESTAMP value in ISO format (*yyyy-mm-dd-hh.mm.ss[.fffffff]*). The VARCHAR value maps to a String .NET data type.
- New behavior in DB2 10: DB2 returns a 26-byte fixed-length TIMESTAMP value, containing a TIMESTAMP value in ISO format. The TIMESTAMP value maps to a DateTime .NET data type.

**Sample application impact (Java):** If the application uses the IBM Data Server Driver for JDBC and SQLJ, then an application change might be required, depending on what method the Java application uses to retrieve the parameter data.

- Before DB2 10 , the getString() method previously returned TIMESTAMP data in ISO format, while the getTimestamp() method returned TIMESTAMP data in Java format
- Beginning in DB2 10 , both the getString() and getTimestamp() methods return the TIMESTAMP value in Java format (*yyyy-mm-dd hh:mm:ss[.fffffff]*).

An application change might be required if the Java application uses the getString() method and the application depends on receiving TIMESTAMP values in ISO format. Applications that use the getTimestamp() method require no change.

Similar considerations apply for TIME parameters. DB2 returns TIME parameters as TIME data values in ISO format (*hh.mm.ss*), regardless of the SQL type of the corresponding argument in the CALL statement. For Java applications, the getString() method now returns TIME data in Java format (*hh.mm.ss*). If a Java application uses the getString() method and requires TIME data in ISO format, the application must be examined for possible changes.

### **Change to IBM Data Server Driver for JDBC and SQLJ handling of TIMESTAMP WITH TIME ZONE data type**

Before DB2 10 new-function mode, the TIMESTAMP WITH TIME ZONE data type was not supported. If a Java client application passed a timestamp input value to a TIMESTAMP column, the IBM Data Server Driver for JDBC and SQLJ did not include the local time zone with the timestamp value. Starting with DB2 10 new-function mode, the TIMESTAMP WITH TIME ZONE data type is supported. If a Java client application passes a timestamp input value to a TIMESTAMP column, the IBM Data Server Driver for JDBC and SQLJ constructs a timestamp input value that includes the local time zone. If the value that the driver sends to

the server is out of supported range for the server, the application receives SQLCODE -181. You can temporarily prevent this error by including IGNORE\_TZ in the settings for the DDF\_COMPATIBILITY subsystem parameter.

## **Changes to datetime built-in functions**

### **Explanation**

Many datetime functions allow arguments containing *string representations of datetime values*. Valid formats for those strings are described in String representations of datetime values (DB2 SQL).

In DB2 10 conversion mode (from Version 8 or Version 9), the following additional string formats are allowed in the specified limited contexts:

- A string value of seven characters representing a date is allowed as an argument to the DATE function only.
- A string value of 8, 13, or 14 characters representing a point in time is allowed as an argument to the TIMESTAMP function only.

### **Possible impact to your DB2 environment**

After migration to DB2 10, applications that provide a seven-character string argument to represent a date for built-in functions other than the DATE function will return an error. Applications that provide a string value of 8, 13, or 14 characters to represent a point in time as an argument for built-in functions other than the TIMESTAMP function also return an error.

### **Actions to take**

To prepare for this change, use valid string formats that are described in String representations of datetime values (DB2 SQL) in arguments for all of your datetime functions.

## **SQLCODE change for subsequent CAF CONNECT attempts**

### **Explanation**

In previous releases, a call attachment facility (CAF) CONNECT request that is followed by another CONNECT request without an intervening disconnect results in a zero return code. In DB2 10, if the second CONNECT request is for a different or unknown subsystem, group attachment, or subgroup attachment name, a -924 SQLCODE is returned. If the second CONNECT request is for the same subsystem, group attachment, or subgroup attachment name, a +361 SQLCODE is returned. A failed attempt to connect to the CAF does not change the current connection. Therefore, in both of these scenarios, the existing CAF connection persists.

### **Possible impact to your DB2 environment**

Some of your applications might receive a -924 or +361 return code where a zero return code was previously returned.

### **Actions to take**

Review your applications for subsequent CONNECT requests for CAF. Modify these applications to handle the new SQLCODEs or rewrite the applications to remove subsequent CONNECT requests.

## Delimiters used for accessing tables on DB2 for Linux, UNIX, and Windows

### Explanation

DB2 10 resolves aliases prior to sending SQL statements to a remote site for applications that use system-directed access. During a remote package bind against the remote site, modified SQL statement text is bound on the remote system. The DRDA\_RESOLVE\_ALIAS subsystem parameter is provided in Version 8 and DB2 9 to help verify applications that are affected by this change of behavior before you migrate to DB2 10.

### Possible impact to your DB2 environment

This change can impact applications that access a DB2 for Linux, UNIX, and Windows server if the SQL preprocessing option QUOTE or QUOTESQL is used. QUOTE or QUOTESQL specifies that a quotation mark (") is used as the string delimiter and an apostrophe (') is used for SQL identifiers in SQL statements. This option does not control how the COBOL compiler processes string delimiters within the application program statements. DB2 for Linux, UNIX, and Windows does not support statement strings that have been precompiled under the QUOTE or QUOTESQL option and returns a warning on the BIND command. DB2 for z/OS does use the precompiler option to govern which string delimiter to use for SQL identifiers when modifying the SQL text. This causes a bind or rebind to fail on DB2 for Linux, UNIX, and Windows in DB2 10 when the QUOTE or QUOTESQL precompiler option is used to generate the DBRM that is the source of the remote bind package processing.

### Actions to take

When accessing a remote table on a DB2 for Linux, UNIX, and Windows server using an alias, applications must be precompiled using the APOST or APOSTSQL option. Character string literals must be delimited by apostrophes and SQL identifiers must be delimited by quotation marks.

## Changes to the LTRIM, RTRIM and STRIP scalar functions

### Explanation

In DB2 10, the LTRIM, RTRIM, and STRIP scalar functions are changed in the following ways:

- When the *string-expression* argument to LTRIM, RTRIM, or STRIP is a mixed data string but contains an invalid sequence of characters, the function raises SQLCODE -171. Prior versions of DB2 tolerated invalid sequences of characters. For example, suppose that you issue the following SQL statement:

```
SELECT HEX(RTRIM(C1)) FROM T;
```

Also suppose column C1 contains X'40400F0F4040'. This is an invalid mixed data string, because two consecutive shift-in control characters (X'0F') is illegal. In prior versions, this statement would return X'40400F0F'. In DB2 10, this statement would return SQLCODE -171 because the argument is an invalid EBCDIC mixed data string.

- When the *string-expression* argument to LTRIM, RTRIM, or STRIP is an EBCDIC mixed data string, a shift-out control character (X'0E') followed immediately by a shift-in control character (X'0F') are trimmed, along with instances of the

trim-character. In prior versions of DB2, the shift-out character and shift-in character are not returned. For example, suppose that you issue the following SQL statement:

```
SELECT HEX(RTRIM(C1)) FROM T;
```

Also suppose that column C1 contains X'40400E0F4040'. In DB2 10, this statement returns an empty string. The X'0E0F' is removed, and then all of the blanks are trimmed, leaving no other characters. In DB2 9, this statement returns X'40400E0F'. The X'0E0F' is not removed, and no blanks to the left of those control characters are removed.

## Possible impact to your DB2 environment

In rare cases, these changes might cause applications running the LTRIM, RTRIM or STRIP functions to produce different results, or introduce an error for jobs that would originally complete successfully.

## Actions to take

These changes occur in DB2 10 conversion mode. You can temporarily override these changes on a subsystem level by setting the BIF\_COMPATIBILITY subsystem parameter to V9\_TRIM. You can temporarily override these changes on an application level by adding schema SYSCOMPAT\_V9 to the front of the PATH bind option or CURRENT PATH special register.

When BIF\_COMPATIBILITY is set to V9\_TRIM, or you use the schemas SYSCOMPAT\_V9.LTRIM, SYSCOMPAT\_V9.RTRIM or SYSCOMPAT\_V9.STRIP, those functions behave as they did in DB2 9. In DB2 9, invalid EBCDIC mixed data strings are tolerated, and a sequence of shift-out control characters (X'0E') followed immediately by shift-in control characters (X'0F') is not trimmed. DB2 10 allows new syntax for LTRIM and RTRIM in the form of a parameter that specifies the trim-character. This new syntax is not affected by the BIF\_COMPATIBILITY subsystem parameter. If two parameters (*string-expression* and *trim-expression*) are specified, DB2 10 behavior is returned.

To modify your applications to handle the DB2 10 behavior for these functions:

1. Set the BIF\_COMPATIBILITY subsystem parameter to V9\_TRIM only if you suspect that an application is adversely affected. The kind of EBCDIC data that would be affected is usually malformed and is not common.
2. Identify applications that need to be modified to handle this change. You can use IFCID trace 0366 to identify the affected applications. A value of 10 for QH0366FN indicates that the application is using the DB2 9 compatible LTRIM, RTRIM, or STRIP.
3. Change any affected applications to handle the new DB2 10 LTRIM, RTRIM or STRIP behavior, including stored procedures, non-inline user-defined functions, and trigger packages.
4. Rebind and prepare packages with the PATH(SYSCURRENT,SYSIIBM) rebind option to use the new DB2 10 LTRIM, RTRIM and STRIP built-in functions. Repeat this step for native stored procedures (SQLPL) and non-inline SQL scalar functions.
5. For views that reference these built-in functions, determine whether the view needs to be changed to have the expected output. Drop and re-create the views with the PATH(SYSCURRENT,SYSIIBM) option, if necessary. Rebind any applications that reference the views with the PATH(SYSCURRENT,SYSIIBM)

option to use the new DB2 10 LTRIM, RTRIM and STRIP built-in functions. Repeat this step for inline SQL scalar functions.

6. For materialized query tables or extended indexes that reference these built-in functions, drop and re-create the materialized query tables or extended indexes with the PATH(SYSCURRENT,SYSIBM) option. Issue the REFRESH TABLE statement for materialized query tables. Rebind any applications that reference the materialized query tables or extended indexes with the PATH(SYSCURRENT,SYSIBM) option to use the new built-in functions. Materialized query tables and extended indexes use the LTRIM, RTRIM and STRIP behavior that is specified during their creation. If a reference statement has a different behavior that is specified by the BIF\_COMPATIBILITY parameter (or a different path), the materialized query table or expression-based index is not used.
7. Change the value of the BIF\_COMPATIBILITY subsystem parameter to CURRENT. This setting enables the new applications, rebinds, and CREATE statements to use the new LTRIM, RTRIM and STRIP functions.

### Qualify user-defined function names

If you use a user-defined function that has the same name as a built-in function that has been added to DB2 10, ensure that you fully qualify the function name. If the function name is unqualified and “SYSIBM” precedes the schema that you used for this function in the SQL path, DB2 invokes one of the built-in functions.

For a list of built-in functions, including those that have been added in DB2 10, see Built-in functions (DB2 SQL).

### SQLCODE changes

Some SQLCODE numbers and message text might have changed in DB2 10. Also, the conditions under which some SQLCODEs are issued might have changed.

### SQL reserved words

DB2 10 has several new SQL reserved words. Refer to Reserved words (DB2 SQL) for the list of reserved words, and adjust your applications accordingly.



## Utility release incompatibilities for migration from DB2 9

When you migrate from DB2 9 to DB2 10, be aware of the utility release incompatibilities.

Plan for the following changes in DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### Changes to RECOVER utility

For point-in-time recovery, the RECOVER utility now enforces the recovery of a base table space together with its associated auxiliary LOB or XML table spaces.

### Changes to COPY CHANGELIMIT

The default value of the COPY CHANGELIMIT option has changed from 1,10 to 10. This new default value means that COPY creates image copies as follows:

- If the percentage of changed pages is greater than 0 and less than 10, COPY creates an incremental image copy.
- If the percentage of changed pages is greater than or equal to 10, COPY creates a full image copy.
- If no pages have changed, no copies are made.

If this behavior is not the outcome that you want for any COPY statements with the CHANGLIMIT default option, change those statements to specify appropriate CHANGLIMIT values.

### **Changes to RUNSTATS INDEX**

In DB2 10, the following changes are made to the RUNSTATS INDEX utility:

- The default SHRLEVEL value is changed from REFERENCE to CHANGE.
- The KEYCARD behavior is always in effect, and the KEYCARD keyword is deprecated. If you specify KEYCARD in the utility job statement, no error message is issued to indicate that the keyword is deprecated.

### **Changes to DSN1PRNT**

In DB2 10, when you run DSN1PRNT with the FORMAT EXPAND option, and the input data sets constitute a full image copy, the input data sets must contain all pages of the original table space, including dictionary pages.

### **Changes to DSNJU004**

The output of the DSNJU004 (print log map) utility has changed. The output of the system-level backup BSDS record now includes the z/OS level of the backup and the catalog copy option. This information is collected by the BACKUP system utility in DB2 10.

### **Changes to LISTDEF**

After you migrate to DB2 10, the LISTDEF utility supports the DEFINED YES and DEFINED NO options. By default, DEFINED YES is used, which means that only defined objects are included or excluded from LISTDEF lists. To include or exclude undefined objects in the LISTDEF, add the DEFINED NO or DEFINED ALL option.

In releases prior to DB2 10, if a LISTDEF list contains only undefined objects, issues message DSNU185I for each undefined object, and LISTDEF returns return code 0. In DB2 10, if a list returns only undefined objects, and DEFINED NO or DEFINED ALL is not specified, LISTDEF issues DSNU1008 and returns return code 4, and DSNU185I messages are not issued.

DB2 10 also adds the HISTORY option, which changes the behavior of the BASE, LOB, XML, and ALL keywords. When one of these keywords is specified and the HISTORY keyword is also specified, non-history objects are filtered out of the resulting list. When one of these keywords is specified and the HISTORY keyword is not specified, history objects are filtered out of the resulting list.

### **MAX\_UTIL\_PARTS subsystem parameter removed**

In DB2 10, the MAX\_UTIL\_PARTS subsystem parameter is removed. Because the LOAD utility no longer uses MAX\_UTIL\_PARTS, there is no longer a limit on the number of partitions of a compressed table space that LOAD can process when the LOAD utility control statement does not contain the PART parameter.

### **Change to reorganization of partition-by-growth table spaces**

In DB2 10, the REORG TABLESPACE utility might leave a table space in COPY-pending status if the following are true:

- The table space is a partition-by-growth table space.
- The table space contains LOB columns.
- Rows are moved to a different partition or a new partition is added to the table space.

### **Change to CHECK DATA and CHECK LOB**

In DB2 10, a new subsystem parameter, CHECK\_SETCHKP, is added to specify whether the CHECK DATA and CHECK LOB utilities are to place inconsistent objects in CHECK PENDING status. By default, this parameter is set to NO, which means that if either of these utilities finds an inconsistency in an object, the object is not placed in CHECK PENDING status. In previous DB2 versions, these utilities place such objects in CHECK PENDING status. To revert to the previous behavior of placing inconsistent objects in CHECK PENDING status, set the CHECK\_SETCHKP subsystem parameter to YES.

## **Command release incompatibilities for migration from DB2 9**

When you migrate from DB2 9 to DB2 10, be aware of the command release incompatibilities.

### **GUPI**


Plan for the following changes in DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### **Change to DISPLAY GROUP DETAIL command**

In DB2 10, the output of the DISPLAY GROUP DETAIL command includes information about subgroups, if any exist.

**Related reference:**


 [-DISPLAY GROUP \(DB2\) \(DB2 Commands\)](#)

### **Change to REBIND PACKAGE command**

In previous releases, the REBIND PACKAGE command did not preserve the old package copies by default. In DB2 10, old package copies are saved when REBIND PACKAGE is used. To change this default behavior, change the value of the PLANMGMT subsystem parameter to OFF.

### **GUPI**

**Related reference:**

 [REBIND PACKAGE \(DSN\) \(DB2 Commands\)](#)

[PLAN MANAGEMENT field \(PLANMGMT subsystem parameter\)](#)

## **Security release incompatibilities for migration from DB2 9**

When you migrate from DB2 9 to DB2 10, be aware of the security release incompatibilities.

Plan for the following changes in DB2 10 that might affect your migration.



Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### **Separate security and system administrator authorities**

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, users with SYSADM authority can no longer manage security objects such as trusted contexts and roles, issue grants, or revoke grants that are made by others. Also, users with SYSCTRL authority can no longer manage roles, issue grants, or revoke grants that are made by others.

If you set SEPARATE SECURITY to NO, which is the default, the SYSADM and SYSCTRL authorities have the same privileges as in the previous release.

### **Changes to the sample connection routine (DSN3SATH)**

In previous versions of DB2, DSN3SATH retrieved the list of secondary authorization IDs from the address-space-level ACEE for connection processing for utilities that run in batch mode. DSN3SATH included code to retrieve the list of secondary authorization IDs from a task-level ACEE, but that code was commented out. In DB2 10, DSN3SATH has been changed to use the task-level ACEE in this case. This change lets utilities that run under stored procedures retrieve the list of secondary authorization IDs from a task-level ACEE.

### **Restriction for SET CURRENT SQLID**

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, there is an additional restriction for the SET CURRENT SQLID statement. If any of the authorization IDs of the process has SYSADM authority, then CURRENT SQLID must be set to one of the authorization IDs of the application process.

### **Restriction for BIND PACKAGE OWNER and BIND PLAN OWNER**

If the SEPARATE SECURITY field on the DSNTIPP1 panel is set to YES, there is an additional restriction for the BIND PACKAGE OWNER and the BIND PLAN OWNER. If any of the authorization IDs of the process has SYSADM authority or SYSCTRL authority, then the OWNER must be set to one of the authorization IDs of the process.

### **Additional role name restrictions**

Previous releases prohibited using SYSADM, SYSCTRL, or PUBLIC as role names. As of Version 10, role names cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, SQLADM, or any name beginning with "SYS."

### **Online-updatable subsystem parameters**

In previous versions of DB2, users with SYSOPR or higher authorities can update the online-updatable subsystem parameters. In DB2 10, the security-related subsystem parameters can only be updated by users that have SECADM or installation SYSADM authority. The subsystem parameters that are affected by this change are:

- AUTHCACH
- BINDNV
- DBACRVW
- EXTSEC
- TCPALVER

## Other release incompatibilities for migration from DB2 9

When you migrate from DB2 9 to DB2 10, be aware of the release incompatibilities.

Plan for the following changes in DB2 10 that might affect your migration.

Release incompatibilities that were changed or added since the first edition of this DB2 10 publication are indicated by a vertical bar in the left margin. In other areas of this publication, a vertical bar in the margin indicates a change or addition that has occurred since the DB2 9 release of this publication.

### Changed default values for some subsystem parameters and installation panel fields

The default values for some subsystem parameters and installation panel fields have changed. The new values are listed in the table below.

Table 17. Subsystem parameters and installation panel fields with new default values

Parameter	Field	Panel	DB2 9 default value	DB2 10 default value
none	BP8K0	DSNTIP2	1000	2000
none	DATABASES	DSNTIPE	100	200
CACHEPAC	PACKAGE AUTH CACHE	DSNTIPP	100K	5M
CACHERAC	ROUTINE AUTH CACHE	DSNTIPP	100K	5M
CHECK_FASTREPLICATION	FAST REPLICATION (none in Version 9.1)	DSNTIP6	PREFERRED	REQUIRED
CHKFREQ	MINUTES/CHECKPOINT	DSNTIPL1	500000 records	5 minutes
CONTSTOR	CONTRACT THREAD STG	DSNTIPE	NO	YES
DB2SORT	UT DB2 SORT USE (none in Version 9.1)	DSNTIP61	DISABLE	ENABLE
DLDFREQ	LEVELID UPDATE FREQ	DSNTIPL1	5	ON
DSMAX	DSMAX	DSNTIPC	9960	20000
EDM_SKELETON_POOL	EDM SKELETON POOL SIZE	DSNTIPC	5120K	10240K
EDMDBDC	EDM DBD CACHE	DSNTIPC	11700K	23400K
EDMPOOL	EDMPOOL LIMIT BELOW THE BAR	DSNTIPC	18142	0 <sup>1</sup>
EDMSTMTC	EDM STATEMENT CACHE	DSNTIPC	56693K	113386K
FLASHCOPY_PPRC	FLASHCOPY PPRC (none in Version 9.1)	DSNTIP6	blank	REQUIRED
IRLMRWT	RESOURCE TIMEOUT	DSNTIPI	60	30
IRLMSWT	TIME TO AUTOSTART	DSNTIPI	300	120
LRDRTHLD	LONG-RUNNING READER	DSNTIPE	0	10
MAXRBLK	RID POOL SIZE	DSNTIPC	8000K	400000K
MINSTOR	MANAGE THREAD STORAGE	DSNTIPE	YES	NO
MONSIZE	MONITOR SIZE	DSNTIPN	256K	1M
NUMLKTS	LOCKS PER TABLE(SPACE)	DSNTIPJ	1000	2000
OPTIOPIN	none	none	DISABLE	ENABLE
PARA_EFF	PARALLELISM EFFICIENCY (none in Version 9.1)	DSNTIP8	100	50

Table 17. Subsystem parameters and installation panel fields with new default values (continued)

Parameter	Field	Panel	DB2 9 default value	DB2 10 default value
PCLOSEN	RO SWITCH CHKPTS	DSNTIPL1	5	10
PLANMGMT	PLAN MANAGEMENT (none in Version 9.1)	DSNTIP8	OFF	EXTENDED
PRIVATE_PROTOCOL	none	none	YES	NO
RRULOCK	U LOCK FOR RR/RS	DSNTIPI	NO	YES
SEQCACH	none	none	BYPASS	SEQ
SEQPRES	none	none	NO	YES
SRTPOOL	SORT POOL SIZE	DSNTIPC	2000K	10000K
STATIME	STATISTICS TIME	DSNTIPN	5	1
STATROLL	STATISTICS ROLLUP	DSNTIP61	NO	YES
URCHKTH	UR CHECK FREQ	DSNTIPL1	0	5
URLGWTH	UR LOG WRITE CHECK	DSNTIPL1	0	10K
UTSORTAL	UT SORT DATA SET ALLOCATION	DSNTIP61	NO	YES

1. Although the default value of EDMPOOL is 0, if you are migrating from Version 9.1, you should use the same value for EDMPOOL that you used in Version 9.1. For more information about setting this parameter, see EDM LIMIT BELOW THE BAR (EDMPOOL subsystem parameter).

If the values that you specified for these parameters are lower than the new default values, you might want to increase your values.

### Changed maximum values for some subsystem parameters

The maximum values for some subsystem parameters have changed. The new values are listed in the table below.

Table 18. Subsystem parameters with new maximum values

Parameter	DB2 9 maximum value	DB2 10 maximum value
CACHEPAC	5M	10M
CACHERAC	5M	10M
CTHREAD	2000	20000
DSMAX	100000	200000
DSSTIME	1440	60
IDBACK	2000	20000
IDFORE	2000	20000
MAXDBAT	1999	19999
MAXOFILR	2000	20000
MONSIZE	16M	64M
STATIME	1440	60

### Changed acceptable values for the DLDFREQ parameter

The values 0 through 32767 for the DLDFREQ subsystem parameter are no longer supported in DB2 10. The acceptable values for DLDFREQ in DB2 10 are ON and

OFF. A value of 0 in previous releases corresponds to a value of OFF in DB2 10. Values 1 through 32767 in previous releases correspond to a value of ON in DB2 10.

### **Changed minimum value for the MONSIZE parameter**

The minimum value for the MONSIZE subsystem parameter has changed from 256K to 1M.

### **Changed minimum value for the OUTBUFF parameter**

The minimum value for the OUTBUFF parameter has changed from 40K to 400K. If you specify a value less than 400K, the installation process changes the value to 400K. Check the region size in the startup procedure for the DB2 system services address space (DSN1MSTR) to ensure that it is large enough to accommodate the increased output buffer size. The recommended setting for the REGION size of the address space is 0M.

### **Changes to STATIME and SYNCVAL parameters**

In DB2 10, the STATIME and SYNCVAL subsystem parameters apply only to IFCIDs 0105, 0106, and 0199. IFCIDs 0001, 0002, 0202, 0217, 0225, and 0230 are no longer controlled by STATIME and SYNCVAL, and the corresponding trace records are written at fixed, one-minute intervals.

### **Changed maximum degree of parallelism for parallel groups**

DB2 10 uses a changed maximum degree of parallelism when the subsystem parameter PARAMDEG is set to 0. To avoid storage shortages, the maximum degree of parallelism has been reduced from ten times the number of CPUs to two times the number of CPUs. If an increase in elapsed time for parallel queries is a problem, specify a value for PARAMDEG that is greater than two times the number of CPUs.

### **Resource limit facility changes**

Before DB2 10, resource limit facility (RLF) limits applied to connections from remote users. These limits applied, regardless of whether the primary or secondary authorization IDs of the users had installation SYSADM or installation SYSOPR authority. Starting with DB2 10, no RLF limits apply to primary or secondary authorization IDs that have installation SYSADM or installation SYSOPR authority.

### **Changed behavior for DDF to use getaddrinfo() instead of gethostid() to obtain IP addresses**

DB2 10 is an IPv6 system and cannot use gethostid() to obtain IP addresses because gethostid() does not support IPv6. Instead, DDF uses getaddrinfo() to obtain IP addresses. getaddrinfo() resolves the host name that is obtained from gethostname() to one or more IP addresses that are specified in the DNS or local host file. Therefore, it is important that the TCP/IP host name that is obtained from gethostname() matches the host name that is specified as part of the domain name in the DNS or local host file, so that an IP address can be obtained.

For details about other methods of specifying an IP address, see “Starting TCP/IP support” on page 976.

### **DB2 10 requires IRLM 2.3**

IRLM 2.3 is delivered with DB2 10. You must use the supplied IRLM procedure. Although IRLM 2.3 is required in DB2 10, you can use the DXRRL183 load module from IRLM 2.2.

## Changes to table space types

The default table space type for new tables is now the partition-by-growth universal table space. The partitioned table space type is deprecated. In new-function mode, you can use an ALTER statement to change single-table table spaces to partition-by-growth universal table spaces.

You cannot use an ALTER statement to change multiple-table table spaces to universal table spaces.

## Altered catalog and directory table spaces

During processing in enabling-new-function mode (from both Version 8 and Version 9), some catalog and directory table spaces are altered to use row-level locking and some tables use reordered-row format. Changes to the structure of the catalog also include new table spaces, new tables, and the use of new LOB columns. As a result, backup and recovery for the catalog is substantially changed.

## DSNTIJIC uses SHRLEVEL CHANGE to copy the DB2 catalog and directory

In DB2 10, job DSNTIJIC is modified to specify SHRLEVEL CHANGE rather than SHRLEVEL REFERENCE. This modification allows other tasks to update the DB2 catalog and directory while DSNTIJIC is executing. If you want to restrict other tasks to only access the catalog and directory when DSNTIJIC is executing, modify your customized copy of DSNTIJIC to use SHRLEVEL REFERENCE.

## Change to job DSNTIJMV

In DB2 10, job DSNTIJMV is modified to use the keyword parameter format for the subsystem parameter control statement in IEFSSNxx members. In previous versions, job DSNTIJMV used the positional parameter format. The two parameter formats cannot be used together in the same IEFSSNxx member.

Example of keyword parameter format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
      INITPARM('DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>>')
```

Example of positional parameter format:

```
ssname,DSN3INI,'DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>>'
```

## Changes to pending states for ALTER statements

Before DB2 10, some ALTER statements produce immediate definition changes, and the table space or index defined in a statement is placed in a restrictive REBUILD-pending (RBDP) or restrictive REORG-pending (REORP) state. In DB2 10 new-function mode, these same ALTER statements are pending definition changes, and the table space or index defined in a statement is placed in an advisory REBUILD-pending (ARBDP) or advisory REORG-pending (AREOR) state. Changes are applied when the table space or index is reorganized or the index is rebuilt, and data in the table space or index can be accessed or updated.

## SYSDATE added as synonym for CURRENT TIMESTAMP(0)

As of DB2 10, SYSDATE is a synonym for CURRENT TIMESTAMP(0). After you migrate to DB2 10 conversion mode (from Version 8 or Version 9), if an object named SYSDATE already exists, all references to the object should specify the name as a delimited identifier ("SYSDATE") to distinguish the object from the CURRENT TIMESTAMP(0) synonym. References to SYSDATE as an ordinary identifier result in SQLCODE -4700.

## **Added precision variable for CURRENT\_TIMESTAMP**

As of DB2 10, an optional timestamp precision can be specified for the CURRENT\_TIMESTAMP special register. The precision is the number of digits of fraction seconds in the timestamp. If a user-defined function with the name CURRENT\_TIMESTAMP already exists, all references to the function should specify the name as a delimited identifier ("CURRENT\_TIMESTAMP") after migration to DB2 10 conversion mode (from Version 8 or Version 9). References to CURRENT\_TIMESTAMP in a function call result in SQLCODE -4700.

## **Catalog and directory data sets converted to SMS-controlled**

In DB2 10, all data sets for the DB2 catalog and directory must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating data sets in extended format and to use extended addressability (EA). See member DSNTIJSS of the DB2 10 SDSNSAMP library for a sample SMS environment. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

During enabling-new-function mode (from both Version 8 and Version 9), some existing table spaces are converted to standalone table spaces. The obsolete table spaces are deleted in enabling-new-function mode (from both Version 8 and Version 9), at which time the data sets for those table spaces are also deleted. For details on the table space conversion, see "Job DSNTIJEN" on page 694.

## **SMF subtype field defined as a two-byte value**

The SMF subtype field should be defined as a two-byte value. Previously, DB2 mapped the field SM10xSTF as a single-byte field that corresponds to the high half of the standard two-byte field location. In DB2 10, SM10xSTF is changed to a two-byte field. This change results in the removal of unused field SM10xRI from the mapping. This change might require change to applications that parse SMF.

## **Changed default OP buffer size**

The online performance (OP) buffer size in DB2 10 defaults to 1 MB unless otherwise specified.

## **Change to processing of IEEE BFP values**

When an underflow IEEE BFP value is encountered during a remote connection or local processing, SQLCODE -802 is issued. In Version 9.1, no SQLCODE was issued in either case.

## **Changed sizes and definitions of trace records**

DB2 10 introduces changes to the definitions and sizes of some IFCID fields. These changes might require modifications to your trace applications.

For more information, see Changed IFCIDs in DB2 10 (DB2 for z/OS What's New?).

## **Changed format of the IFCID 0002, 0003, 0148, and 0306 trace records**

For IFCID 0002, the format of the distributed data facility area, which is mapped by QLST fields, has changed substantially. For IFCID 0003, the format of the distributed data facility area, which is mapped by QLAC fields, has changed substantially. For IFCID 0148, the format of the distributed accounting records has changed substantially. Any application that reads and interprets location statistics

must be modified to account for the DB2 10 format of IFCID 0002, 0003, and 0148. For IFCID 0306, the definition of field QW0306AD has changed and the size of the area mapped by field QW0306OF has increased. The first eight bytes of field QW0306AD are now "V10 " to indicate that the data is from DB2 10 and that the DB2 10 mapping should be used.

## **Change to connection and sign-on routines**

### **Explanation**

In previous releases, the EXPLSITE value that is passed to the DSN3@ATH connection and DSN3@SGN sign-on exit routines, relative to an upstream DB2 for z/OS requester system partner, could be either a network address or the partner's actual location name. In DB2 10, the connection and sign-on exit routines are passed an EXPLSITE value that reflects a network address that is relative to the DB2 for z/OS requester system.

### **Possible impact to your DB2 environment**

Because the connection and sign-on exit routines might base authentication decisions on the EXPLSITE value, you might have different authentication results in DB2 10 than in previous releases.

### **Actions to take**

To prepare for this change, examine the logic of your connection and sign-on exit routines. Determine if they have dependencies on the EXPLSITE value being relative to remote upstream DB2 for z/OS requester partner location names. If such dependencies exist, before migration to DB2 10, modify the exit routine logic to accept EXPLSITE values that are either the network address or the actual location name for upstream DB2 for z/OS requester partners. After migration to DB2 10 new-function mode, you can optionally modify the exit routines to remove dependencies on the EXPLSITE value being an actual DB2 for z/OS requester partner location name.

## **All user-defined indexes on the DB2 catalog are managed by DB2**

### **Explanation**

Beginning in DB2 10 enabling-new-function mode, any indexes that exist on the catalog are treated as being managed by DB2. New data sets are defined in the SMS environment for the DB2 catalog data sets.

### **Possible impact to your DB2 environment**

DB2 ignores any data sets that you define for user-defined indexes on the catalog that are user-managed.

### **Actions to take**

Determine whether your DB2 catalog has any user-defined indexes. These indexes are reported in job DSNTIJPM.

If these indexes exist, drop and re-create them in DB2 10 enabling-new-function mode or later.

### **Related information:**

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

Run premigration queries (DSNTIJPM)

### **SYSIBM.SYSDUMMYx tables relocated to the DB2 catalog in conversion mode**

The following user tables are relocated to the DB2 catalog during migration to DB2 10 conversion mode, when you run job DNSTIJTC:

- SYSIBM.SYSDUMMYA table (DB2 SQL)
- SYSIBM.SYSDUMMYE table (DB2 SQL)
- SYSIBM.SYSDUMMYU table (DB2 SQL)

For more information about the restructured catalog in DB2 10, see:

Migration step 18: Tailor DB2 10 catalog: DSNTIJTC

DB2 catalog restructured (DB2 for z/OS What's New?)

DB2 catalog tables (DB2 SQL)

SYSDUMMYx tables (Introduction to DB2 for z/OS)

## **Functions that are no longer supported for systems migrating from DB2 9**

If you are migrating to DB2 10 from DB2 9, be aware of the functions that are no longer supported.

The following functions are not supported in DB2 10.

### **BookManager format is discontinued**

IBM is discontinuing the BookManager format as part of an ongoing effort to deliver the best possible information experience to our customers. IBM optimizes DB2 10 for z/OS documentation for viewing in IBM Knowledge Center.

The BookManager books will continue to be provided for the life cycle of DB2 Version 8 and DB2 9; however, IBM is not delivering BookManager books beginning in DB2 10. The includes all of the information that you are used to seeing in BookManager and PDF, plus many improved features for finding and viewing the information that you need to do your job.

### **msys for Setup DB2 Customization Center**

In DB2 10, msys for Setup DB2 Customization Center is removed. Instead, use the installation panels. For more information about using the installation panels, see Tailoring DB2 jobs to your environment using the installation CLIST.

### **REPAIR INDEXES keyword**

The INDEXES keyword of the REPAIR utility is no longer supported. To repair all indexes, specify INDEX(ALL), followed by a *table-space-spec*.

### **Optimization Service Center**

In DB2 10, Optimization Service Center is no longer supported. The recommended no-charge query optimization and service tool is IBM Data Studio, which is a query serviceability tool for DB2 10 for z/OS. This tool is based and built on the



foundation of Optimization Service Center and Optimization Expert.

## **DB2 XML Extender**

DB2 XML Extender is no longer supported. In DB2 10, you can use the XML data type instead.

## **DB2 Management Clients feature**

DB2 Management Clients feature, which includes DB2 Administration Server, DB2 Control Center, and DB2 Development Center, is no longer supported. Instead, use IBM Data Studio to design, develop, deploy, and manage your data-driven applications.

## **Some supplied routines**

The following supplied routines are removed in DB2 10 and are unavailable to callers after migration to conversion mode (from Version 8 or Version 9). A report is added to the DSN TIJPM premigration job to detect occurrences of these routines on an existing subsystem or data sharing group, and to specify that these routines are not available in Version 10.

- DSN8.DSN8EXP
- AMI-based DB2 MQ functions
  - DB2MQ1C.GETCOL
  - DB2MQ1C.MQPUBLISH
  - DB2MQ1C.MQREAD
  - DB2MQ1C.MQREADALL
  - DB2MQ1C.MQREADALLCLOB
  - DB2MQ1C.MQREADCLOB
  - DB2MQ1C.MQRECEIVE
  - DB2MQ1C.MQRECEIVEALL
  - DB2MQ1C.MQRECEIVEALLCLOB
  - DB2MQ1C.MQRECEIVECLOB
  - DB2MQ1C.MQSEND
  - DB2MQ1C.MQSUBSCRIBE
  - DB2MQ1C.MQUNSUBSCRIBE
  - DB2MQ2C.GETCOL
  - DB2MQ2C.MQPUBLISH
  - DB2MQ2C.MQREAD
  - DB2MQ2C.MQREADALL
  - DB2MQ2C.MQREADALLCLOB
  - DB2MQ2C.MQREADCLOB
  - DB2MQ2C.MQRECEIVE
  - DB2MQ2C.MQRECEIVEALL
  - DB2MQ2C.MQRECEIVEALLCLOB
  - DB2MQ2C.MQRECEIVECLOB
  - DB2MQ2C.MQSEND
  - DB2MQ2C.MQSUBSCRIBE
  - DB2MQ2C.MQUNSUBSCRIBE

- | - DB2MQ1N.GETCOL
- | - DB2MQ1N.MQPUBLISH
- | - DB2MQ1N.MQREAD
- | - DB2MQ1N.MQREADALL
- | - DB2MQ1N.MQREADALLCLOB
- | - DB2MQ1N.MQREADCLOB
- | - DB2MQ1N.MQRECEIVE
- | - DB2MQ1N.MQRECEIVEALL
- | - DB2MQ1N.MQRECEIVEALLCLOB
- | - DB2MQ1N.MQRECEIVECLOB
- | - DB2MQ1N.MQSEND
- | - DB2MQ1N.MQSUBSCRIBE
- | - DB2MQ1N.MQUNSUBSCRIBE
- | - DB2MQ2N.GETCOL
- | - DB2MQ2N.MQPUBLISH
- | - DB2MQ2N.MQREAD
- | - DB2MQ2N.MQREADALL
- | - DB2MQ2N.MQREADALLCLOB
- | - DB2MQ2N.MQREADCLOB
- | - DB2MQ2N.MQRECEIVE
- | - DB2MQ2N.MQRECEIVEALL
- | - DB2MQ2N.MQRECEIVEALLCLOB
- | - DB2MQ2N.MQRECEIVECLOB
- | - DB2MQ2N.MQSEND
- | - DB2MQ2N.MQSUBSCRIBE
- | - DB2MQ2N.MQUNSUBSCRIBE
- | • MQSeries publish and subscribe XML routines
- | - DB2MQ1C.PUBLISHXML
- | - DB2MQ2C.PUBLISHXML
- | • MQSeries XML routines
- | - DMQXML1C.DXXMQGEN
- | - DMQXML1C.DXXMQGENCLOB
- | - DMQXML1C.DXXMQINSERT
- | - DMQXML1C.DXXMQINSERTALL
- | - DMQXML1C.DXXMQINSERTALLCLOB
- | - DMQXML1C.DXXMQINSERTCLOB
- | - DMQXML1C.DXXMQRETRIEVE
- | - DMQXML1C.DXXMQRETRIEVECLOB
- | - DMQXML1C.DXXMQSHRED
- | - DMQXML1C.DXXMQSHREDALL
- | - DMQXML1C.DXXMQSHREDALLCLOB
- | - DMQXML1C.DXXMQSHREDCLOB
- | - DMQXML1C.MQPUBLISHXML
- | - DMQXML1C.MQRCVALLXMLCLOB
- | - DMQXML1C.MQREADALLXML

- DMQXML1C.MQREADALLXMLCLOB
- DMQXML1C.MQREADXML
- DMQXML1C.MQREADXMLCLOB
- DMQXML1C.MQRECEIVEALLXML
- DMQXML1C.MQRECEIVEXML
- DMQXML1C.MQRECEIVEXMLCLOB
- DMQXML1C.MQSENDXML
- DMQXML1C.MQSENDXMLFILE
- DMQXML1C.MQSENDXMLFILECLOB
- DMQXML2C.DXXMQGEN
- DMQXML2C.DXXMQGENCLOB
- DMQXML2C.DXXMQINSERT
- DMQXML2C.DXXMQINSERTALL
- DMQXML2C.DXXMQINSERTALLCLOB
- DMQXML2C.DXXMQINSERTCLOB
- DMQXML2C.DXXMQRETRIEVE
- DMQXML2C.DXXMQRETRIEVECLOB
- DMQXML2C.DXXMQSHRED
- DMQXML2C.DXXMQSHREDALL
- DMQXML2C.DXXMQSHREDALLCLOB
- DMQXML2C.DXXMQSHREDCLOB
- DMQXML2C.MQPUBLISHXML
- DMQXML2C.MQRCVALLXMLCLOB
- DMQXML2C.MQREADALLXML
- DMQXML2C.MQREADALLXMLCLOB
- DMQXML2C.MQREADXML
- DMQXML2C.MQREADXMLCLOB
- DMQXML2C.MQRECEIVEALLXML
- DMQXML2C.MQRECEIVEXML
- DMQXML2C.MQRECEIVEXMLCLOB
- DMQXML2C.MQSENDXML
- DMQXML2C.MQSENDXMLFILE
- DMQXML2C.MQSENDXMLFILECLOB

### **Some subsystem parameters**

The following subsystem parameters are removed in DB2 10:

- ACCEL\_LEVEL
- EDMBFIT
- INLIST\_PTC
- HOPAUTH
- LOGAPSTG
- MAX\_UTIL\_PARTS
- OPTHYBCST
- OPTIXOPREF
- OPTOIRCPF

- PARTKEYU
- PREVALKEEP
- SJMISSKY
- XMLTABJPD

## **EXPLAIN tables in pre-DB2 Version 8 format and EXPLAIN tables in EBCDIC encoding**

In DB2 10, EXPLAIN tables in a format earlier than DB2 Version 8 are no longer supported. Before migration to DB2 10, these tables must be converted to the format of the current (DB2 Version 8 or DB2 9) release. Starting in DB2 10 conversion mode (from either DB2 Version 8 or DB2 9), DB2 returns SQLCODE -20008 for statements or commands that invoke EXPLAIN processing if EXPLAIN tables are in a pre-Version 8 format.

Also in DB2 10, EXPLAIN tables that are encoded in EBCDIC are no longer supported. If an EXPLAIN table is in DB2 10 format and encoded in EBCDIC, SQLCODE -878 is returned. However, for transition purposes, EXPLAIN tables that are in Version 8 or DB2 9 format can be encoded in EBCDIC. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or DB2 9 format, regardless of the encoding type. For more information about converting your EXPLAIN tables, see “Converting EXPLAIN tables (before migration)” on page 43.

## **Private protocol**

The private protocol remote data access method is no longer supported as of DB2 10. DRDA protocol must be used instead. Packages and plans that were bound with DBPROTOCOL(PRIVATE) in a previous release can exist in DB2 10 and might run in DB2 10. If an application that executes packages or plans that were bound with DBPROTOCOL(PRIVATE) only accesses objects that are local to the DB2 subsystem, the application should run successfully. If an application that executes packages that were bound with DBPROTOCOL(PRIVATE) accesses a remote location, the application fails.

## **Annotated XML schema decomposition using XDBDECOMPXML and XDBDECOMPXML100MB**

Using the XDBDECOMPXML and XDBDECOMPXML100MB supplied stored procedures for annotated XML schema decomposition is no longer supported. Also, calling the SYSPROC.XSR\_COMPLETE stored procedure with the **issuedfordecomposition** parameter set to 1 is not supported.

Instead of using annotated XML schema decomposition, you should use the XMLTABLE function to decompose XML documents. However, if you need to use XML schema decomposition in DB2 10 conversion mode from Version 9, make the XML schema decomposition stored procedures available by concatenating the DB2 9 STEPLIB. Or, copy DSNNVDCP and its alias names, DSNNVDCA and DSNNVDCB, to the DB2 10 *prefix*.SDSNLOAD.

XML schema decomposition does not work in DB2 10 new-function mode.

## REORG TABLESPACE SHRLEVEL NONE on LOB table spaces

In DB2 10 new-function mode, running the REORG TABLESPACE utility with the SHRLEVEL NONE option on a LOB table space is no longer supported. If SHRLEVEL NONE is specified, the utility immediately completes with return code 0 without performing the reorganization. SHRLEVEL REFERENCE or SHRLEVEL CHANGE should be used instead.

## Monitoring and optimizing queries with profile tables

In DB2 10, the ability to use profile tables to monitor and optimize queries is no longer supported. The DSN\_STATEMENT\_RUNTIME\_INFO and DSN\_OBJECT\_RUNTIME\_INFO tables are no longer supported. The MONITOR, MONITOR CPUTIME, MONITOR SPIKE, and MONITOR RLF profile keywords are also no longer supported.

## INDEXES keyword for REPAIR

The INDEXES keyword of the REPAIR utility is no longer supported. To repair all indexes, specify INDEX(ALL), followed by a *table-space-spec*.


---

## Planning for DB2 data sharing

DB2 data sharing introduces special requirements for your DB2 and z/OS environments.

### Related concepts:

Release coexistence in a data sharing environment

 Introduction to DB2 data sharing (DB2 Data Sharing Planning and Administration)

### Related tasks:

Preparing for DB2 10 migration in DB2 data sharing

Installing, migrating, and enabling DB2 data sharing

## Parallel Sysplex requirements for DB2 data sharing


DB2 data sharing depends on hardware and software components in the z/OS Parallel Sysplex.

## Coupling facility

Install and define at least one coupling facility to z/OS before enabling the DB2 data sharing function. For high availability, more than one coupling facility is required.

Data sharing member names from the subsystem parameter load module (DSNZPARM) are used to connect members to the coupling facility at DB2 startup. The first connector causes the list structure to be allocated in a coupling facility based on the preference list in the active CFRM policy.

### Related concepts:

 Subsystem parameters (Introduction to DB2 for z/OS)

### Related tasks:

Specifying a member's subsystem parameter load module

### Related reference:

➡ Adding MVS systems to a sysplex

## Cross-system coupling facility component of z/OS

During startup, the members of a data sharing group join one cross-system coupling facility (XCF) group, and their associated internal resource lock managers (IRLMs) join another XCF group.

The z/OS cross-system extended services (XES) also join an XCF group implicitly on behalf of the IRLM connection to the lock structure. To join a particular group, the data sharing group members and the IRLMs use the names that you specify during DB2 installation.

DB2 uses the XCF for certain intersystem communications. Use both the coupling facility and channel-to-channel connections for XCF signaling. See Adding MVS systems to a sysplex for more information about configuring the XCF.

### Coupling facility structures:

DB2 relies on areas of storage in the coupling facility called *structures*.

Three types of structures exist: lock, list, and cache. Each structure type has a unique function. The following figure shows a sample configuration of the coupling facility structures that are used by DB2.

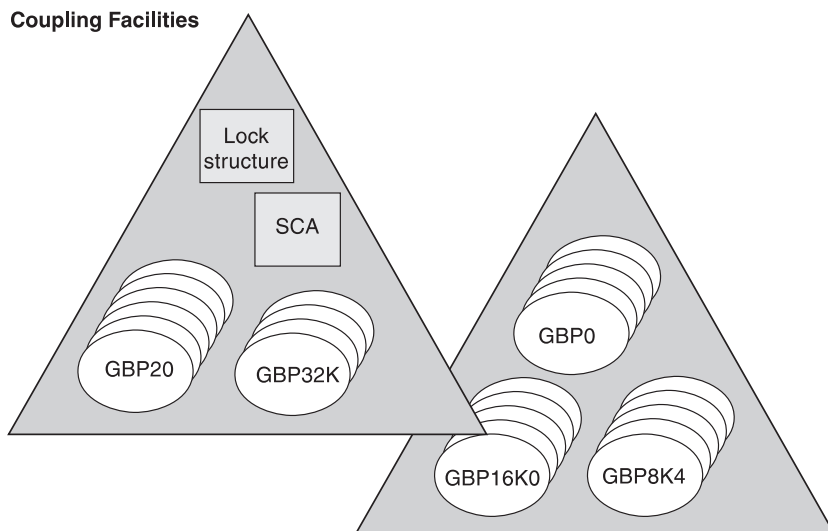


Figure 1. Coupling facility structures that are used by DB2. This is a sample configuration. The lock structure and list structure (SCA) do not need to be in the same coupling facility.

Members of a data sharing group use the following coupling facility structures to communicate and move data among themselves.

### Lock structure

The lock structure protects shared DB2 resources (such as table spaces and pages) and enables concurrent access to those resources.

The system lock manager (SLM), a component of the z/OS cross-system extended services (XES), presents global lock information to the lock structure on behalf of each member's IRLM.

The lock structure consists of two parts: a coupling facility lock list table (called the *modified resource list*), and a coupling facility lock hash table

(called the *lock table*). The modified resource list records locks that protect changed data, thereby protecting the data in case of failure. The lock table contains the lock status information and the owning members of those locks, and is used to provide global lock serialization.

#### **List structure (SCA)**

The list structure contains the DB2 shared communications area (SCA). Each member uses the SCA to pass control information to the rest of the members in the group. The SCA contains all database exception status conditions and other information that is necessary for recovery of the group.

#### **Cache structures (DB2 group buffer pools)**

The cache structures are used as group buffer pools (GBPs), caching shared data pages for the members. You have the following options for caching data of interest to more than one member of a group:

- Cache all data (read-only and updated)
- Cache only data that is updated
- Cache only system control pages (specific to LOB table spaces)
- Cache no data; use the group buffer pool only for cross-invalidation

Group buffer pools use a cross-invalidation mechanism to maintain data consistency across the buffer pools of group members. Shared data pages are registered in a group buffer pool directory in each cache structure, thus enabling the coupling facility control program to cross-invalidate the copies of data pages that are held in individual member buffer pools.

Cross-invalidation takes place when a member's own buffer pool does not contain the latest version of the data. In this case, the member must reread the pages from either the group buffer pool or disk, if that member needs to reference the pages again.

One group buffer pool exists for all member buffer pools of the same name. For example, each member must have a buffer pool 0 (BP0) that contains the catalog and directory table spaces. A group buffer pool 0 (GBP0) must exist on a coupling facility for that data sharing group.

Similarly, if a member creates table space X and associates it with buffer pool 1 (BP1), X is associated with BP1 for every member because there is only one definition of X in the catalog for the entire group. To share the data in X, you must define the cache structure, group buffer pool 1 (GBP1). If you do not define the group buffer pool, a single member can update X or more than one member can read X, but there can be no inter-DB2 read/write activity for X.

**Recommendation:** For data that is private to each member, such as work files or user data that only one member reads, define that data to a buffer pool for non-shared page sets. For example, assume that you want to associate all non-shared page sets with buffer pool 6 (BP6). If you want only member DB2A to access a non-shared table space Y, then define Y (and any indexes) to BP6. Define BP6 with a size of 0 (zero) and then you do not need to define the coupling facility structure for group buffer pool 6. By moving private data to buffer pools that are separate from buffer pools used by shared data, you can more easily monitor, and provide for more predictable performance of, private data.

#### **Defining coupling facility structures:**

Before you enable DB2 data sharing, you must define coupling facility structures.

## About this task

You must define one lock structure, one list structure, and at least four cache structures:

- Group buffer pool 0
- Group buffer pool 8K0
- Group buffer pool 16K0
- Group buffer pool 32K

The lock structure and list structures (SCAs) do not need to be in the same coupling facility. Individual structures cannot span coupling facilities.

**Recommendation:** Use a Sysplex Failure Management (SFM) policy to define the availability characteristics of the coupling facility structures for lost connectivity failures, which includes a total failure of the coupling facility.

## Procedure

To define coupling facility structures:

1. Determine the following characteristics of your DB2 coupling facility structures:

### Initial size and maximum size of the structures

The structures can be dynamically resized from INITSIZE up to the value in SIZE.

### Structure names

Determine the names that you will use for the coupling facility structures.

### Availability characteristics

You must know the preference list (PREFLIST) for rebuilding or reallocating a structure, if the coupling facility fails.

2. Use the z/OS coupling facility resource management (CFRM) policies to define these structures to the Parallel Sysplex and define a SFM policy.

A CFRM policy determines how and where the structure resources are allocated.

See Adding MVS systems to a sysplex for information about how to create CFRM and SFM policies.

## Example

A sample CFRM policy is shown in the following figure.



```

//POLICYX JOB MSGCLASS=Z,REGION=2000K,CLASS=A,
//          MSGLEVEL=(1,1)
//STEP1 EXEC PGM=IXCMIAPU
//STEPLIB DD DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(CFRM) REPORT(YES)
DEFINE POLICY NAME(POLICYX) REPLACE(YES)
  STRUCTURE NAME(DSNDB0A_LOCK1)
    INITSIZE(32000)
    SIZE(64000)
    REBUILDPERCENT(5)
    PREFLIST(CF01,CF02)
  STRUCTURE NAME(DSNDB0A_GBP0)
    INITSIZE(50000)
    SIZE(100000)
    REBUILDPERCENT(5)
    DUPLEX(ALLOWED)
    PREFLIST(CF02,CF01)
  STRUCTURE NAME(DSNDB0A_GBP1)
    INITSIZE(50000)
    SIZE(100000)
    PREFLIST(CF02,CF01)
    DUPLEX(ENABLED)
  STRUCTURE NAME(DSNDB0A_SCA)
    INITSIZE(10000)
    SIZE(20000)
    REBUILDPERCENT(5)
    PREFLIST(CF01,CF02)

  CF NAME(CF01) TYPE(009674)
    MFG(IBM)
    PLANT(00)
    SEQUENCE(000000040016)
    PARTITION(1)
    CPCID(00)
    DUMPSPACE(1200)

  CF NAME(CF02) TYPE(009674)
    MFG(IBM)
    PLANT(00)
    SEQUENCE(000000040029)
    PARTITION(1)
    CPCID(00)
    DUMPSPACE(1200)
//

```

*Figure 2. Sample CFRM policy*

**Related concepts:**

- | Coupling facility availability
- | Coupling facility structure names
- | Duplexed structures
- | Storage estimates for data sharing environments
- | How to change structure sizes
- | How structures are rebuilt when connectivity is lost

**Authorization for DB2 to access coupling facility structures:**

| Optionally, you can set up a facility class profile to limit access to the structures in  
| the coupling facility.

If you do this, ensure that DB2 does have access by ensuring that the IDs that are associated with the DB2 address spaces have alter access authority to the coupling facility structures through RESOURCE(IXLSTR.*structure\_name*) in SAF class CLASS(FACILITY).

If you do not create a facility class profile, the default allows any authorized user or program (supervisor state and program key mask allowing key 0-7) to issue coupling facility macros for the structure.

### **Sysplex timer**

Install at least one Sysplex Timer in the Parallel Sysplex.

For high availability, more than one Sysplex Timer is required. The Sysplex Timer synchronizes the timestamps of the IBM System z9® or System z10® and IBM Z servers for all members of the data sharing group. DB2 data sharing uses a value that is derived from the timestamp (as seen in the log) to recover data.

### **Common z/OS libraries**

DB2 supports a configuration with a SYS1.PARMLIB and SYS1.PROCLIB that is shared by all z/OS systems in the Parallel Sysplex. This configuration lets you add and modify systems more easily.

If you intend to have many members in the Parallel Sysplex, each DB2 and IRLM that you define to the z/OS system in the IEFSSNxx parmlib member **requires** a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your DB2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs to start the members.

If you need more than 165 LXs, use the NSYSLX option on the z/OS IEASYSxx parmlib member to increase this number. See z/OS MVS Initialization and Tuning Reference for more information.

#### **Related concepts:**

Naming recommendations for a DB2 data sharing environment

### **Connectivity requirements in a Parallel Sysplex**

DB2 data sharing requires that all DB2-related resources reside on shared disks. These resources include the DB2 catalog and directory and any user data, and the integrated catalog for DB2 data sets.

Also, all the members' logs and bootstrap data sets (BSDSs) must be on shared disks for recovery purposes. A member that performs recovery must have access to the logs of other members in the group.

**Recommendation:** Place work files on shared disks for the following reasons:

- For queries that are processed using Sysplex query parallelism, the placement of work files on shared disks is a requirement. Each assisting member writes to its own work file, and the coordinator can read the results from the assistants' work files.
- A member stays connected to its work file even if you need to restart the member on another processor.
- You can create or drop a work file table space from any other member in the data sharing group.

Ensure that you have physical connectivity by checking the following connections:

- Verify that one user-integrated catalog facility exists for cataloging the data sets of a data sharing group, and that you can access this catalog from each z/OS system in the Parallel Sysplex.
- Verify connectivity to the following entries from each system on which a member resides:
  - A set of DB2 target libraries
  - A single DB2 catalog
  - A single DB2 directory
  - All databases that are shared
  - All log data sets
  - All BSDS data sets
  - All coupling facilities used by the data sharing group
  - User integrated catalog facility catalogs for shared databases

## Data sharing naming conventions

Some parts of a data sharing system require you to choose a valid name, while other names are generated during DB2 installation.

Carefully consider the naming convention you will use to name the various parts of the data sharing system. Assign names to both IRLM and data sharing groups, and to members within a group. One recommendation is to make names and prefixes unique within the Parallel Sysplex. Although this uniqueness is not required for all names, it helps you avoid problems with identifying and moving entities among z/OS systems in the Parallel Sysplex.

### Related tasks:

Renaming a member by performing an IPL

Renaming a member by stopping DB2

## Data sharing group names

Group names are shared by all members of the data sharing group. DB2 group names include the generic LU name, group attachment name, location name, and coupling facility structure names.

The following names are considered group names:

### DB2 group name

The name that encompasses the entire data sharing group. The coupling facility structure names are based on this name.

The DB2 group name must be unique within the Parallel Sysplex. If you use this name as a basis for the location name, the DB2 group name must be unique within the network.

This name can be up to eight characters long, it must begin with an alphabetic character, and it can consist of the characters A-Z, 0-9, \$, #, and @. An example of a DB2 group name is DSNDB0A.

**Restrictions:** To avoid names that IBM uses for its XCF groups, do not begin DB2 group names with the letters A-I unless the first three characters are DSN. Do not use the string SYS as the first three characters, and do not use the string UNDESIG as the group name.

**Important:** Never reuse a DB2 group name, even if a data sharing group that previously used the name no longer exists. Some data sharing information, such as the DB2 group name, is retained in the Parallel

Sysplex couple data set (CDS). To determine what DB2 group names exist, execute the z/OS command DISPLAY XCF,GROUP.

#### **ICF catalog alias**

The name of the Integrated Catalog Facility (ICF) catalog alias that you must place in the z/OS master catalog. This name can be up to 8 characters long, and it should be the same as the DB2 group name. An example of an ICF catalog alias name is DSNDB0A.

#### **Group attachment name**

The name that is used by the TSO/batch attachment, the call attachment facility (CAF), DL/I batch, utilities, and the Resource Recovery Services attachment facility (RRSAF) as a “generic” attachment name. This name can be up to four characters long. An example of a group attachment name is DB0A.

#### **Subgroup attachment name**

The name that is used by TSO, CAF, RRSAP, JDBC, ODBC, and DB2 utilities connections requests to identify which subgroup attachment to use. This name can be up to four characters long. An example of a subgroup attachment name is SBG1.

To specify subgroup attachment names, you must use DB2 10 early code.

#### **Catalog and directory database names**

All DB2 subsystems in the group share the same catalog and directory. Examples of the catalog and directory database names are *catalias.DSNDB01* and *catalias.DSNDB06*.

#### **Application defaults module>**

The name of the module that contains the application programming defaults. This module resides in SDSNEXIT. The name can be up to eight characters long. DSNHDECP is an example module name.

#### **Target libraries**

Target libraries can be shared among DB2 group members or can be replicated. Example names for target libraries are *catalias.SDSNCLST*, *catalias.SDSNLINK*, *catalias.SDSNLOAD*, and *catalias.SDSNEXIT*.

#### **Network Address**

The group DVIPA and port number. It can be an IPv4 address, an IPv6 address, or both.

#### **DRDA port number**

The port number that is used by the distributed data facility (DDF) to accept incoming SQL connection requests, if the data sharing group uses TCP/IP. 446 is the recommended DRDA port.

#### **Secure DRDA port number**

The secure port identifies the TCP/IP port number that is used by DDF to accept inbound secure DRDA connection requests.

#### **Location name**

The name that is used when the data sharing group processes distributed requests. The group is treated as a single location by remote requesters. Requesters use this name in their SQL applications. This name can be up to 16 characters long.

#### **Generic LU name**

This name lets remote requesters configure their systems to treat the data sharing group as a single LU. This name can be up to eight characters long.

### Parallel Sysplex domain name

This name lets you take advantage of workload balancing for TCP/IP connections.

### Group IPv4 address

GRPIPV4 identifies a constant IPv4 address to be associated with the data sharing group for which this DDF is a member.

### Group IPv6 address

GRPIPV6 identifies a constant IPv6 address to be associated with the data sharing group for which this DDF is a member.

### Related concepts:

Group attachment names and subgroup attachment names

➡ Communicating with data sharing groups (DB2 Data Sharing Planning and Administration)

➡ Group access (DB2 Data Sharing Planning and Administration)

➡ Specifying the DRDA port number (DB2 Data Sharing Planning and Administration)

### Group attachment names and subgroup attachment names

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and DB2 utilities connections to find active DB2 subsystems.

A group attachment name acts as a generic name for all the members of a data sharing group. Subgroup attachment names can be used to specify a subset of members within a group attachment and provide more organization and control over connection requests. To specify subgroup attachment names, you must use DB2 10 early code.

Specify the group attachment name and subgroup attachment name for a subsystem in member IEFSSNxx. You can let the DB2 installation process do this for you by specifying the names on installation panel DSNTIPK, or you can update the member yourself. If you use the DSNTIPK panel, the installation CLIST places the specified names in the IEFSSNxx member and in the DSNHDECP load module for the group. Specify the group attachment name and subgroup attachment name at a convenient time (during a planned IPL, for example).

The following rules apply to group attachment and subgroup attachment names:

- A subgroup attachment cannot have the same name as a group attachment.
- Neither the group attachment nor the subgroup attachment should have the same name as a DB2 member.
- If you specify a subgroup attachment name, you must also specify a group attachment name. A subgroup attachment must belong to one, and only one group attachment.
- A member can belong to one subgroup attachment at most and does not need to belong to a subgroup attachment.

The group attachment name and subgroup attachment name are included in the output for the command DISPLAY GROUP.

Even if you have not yet enabled data sharing, the group attachment name and subgroup attachment name is active after you IPL the system. An active group attachment name and subgroup attachment name in a non-data sharing environment is not a problem. Until you are ready to move to data sharing,

continue to specify the DB2 subsystem name in your TSO and batch jobs. When you are ready to move to data sharing, you can change those jobs to specify a group attachment name and subgroup attachment name without the need for an IPL.

### **How DB2 chooses a subsystem name**

When you submit a job on a z/OS system, DB2 treats the name that you specified on the DB2 connection request as a subsystem name, a group attachment name, or a subgroup attachment name. DB2 first assumes that the name is a subsystem name and attaches to that subsystem if either of the following is true:

- The subsystem is started.
- The subsystem is not started, and NOGROUP was specified in the DB2 connection request. NOGROUP indicates that group attachment or subgroup attachment processing is not to be considered. If RETRY was specified in the command, DB2 tries to attach the subsystem again in 30 seconds. The value of RETRY determines the number of times that DB2 re-attempts to attach.

DB2 assumes that the name on the DB2 connection request is a group attachment name or subgroup attachment name if no qualifying subsystem is found and either of the following is true:

- No subsystem with the name in the command is defined.
- A subsystem with that name is not started, the group attachment name or subgroup attachment name is the same as its subsystem name, and NOGROUP was not specified in the DB2 connection request.

When DB2 assumes that the name is a group attachment name or subgroup attachment name, it performs the following actions:

- Constructs a list of DB2 subsystems that are defined to this z/OS.  
To create the list, DB2 adds each subsystem during subsystem initialization. At IPL time, subsystems are initialized in the order in which they appear in member IEFSSNxx if the MVS Subsystem Interface (SSI) is running on a single processor. If the MVS SSI is running on multiple processors in parallel, the subsystems are placed in the group attachment name list in the order that they complete initialization. In this case, the order of the list is unpredictable. If you add a subsystem with the z/OS SETSSI command, that subsystem is added to the list at that time.
- Tries to attach to the subsystems in the list in random order until it finds one that is started on this z/OS. However, if RANDOMATT=NO has been specified for a DB2 subsystem, that subsystem is excluded from the random search.
- Searches for any available DB2 subsystem within the group or subgroup, including those that specify RANDOMATT=NO, if the random search finds no available DB2 subsystems or if RANDOMATT=NO is specified for all subsystems. Search order is defined according to the order in which z/OS subsystem initialization completes for each DB2 subsystem. If you want to direct work to certain DB2 subsystems, set the RANDOMATT subsystem parameter to YES on those subsystems. If you want to direct work away from certain DB2 subsystems, set the RANDOMATT subsystem parameter to NO on those subsystems.

If the name on the DB2 connection request is not a group attachment name or subgroup attachment name, a “not started” message is returned.

If you need to prevent a batch workload from running on a DB2 subsystem that is intended for high-performance online transactions, specify RANDOMATT=NO for the online subsystems and RANDOMATT=YES for the batch workload subsystems. In that case, the batch jobs use the group attachment name or subgroup attachment name, and the online subsystem does not.

Alternatively, to achieve non-randomized group attachments or subgroup attachments, as in Version 8 of DB2, specify RANDOMATT=NO for all members of the group.

### **When a subsystem and a group attachment name or subgroup attachment name are the same**

When you begin moving to data sharing, ensure that your IEFSSNxx definitions are correct and DB2 connection requests are coded to get the results that you intend. You should especially ensure that the definitions are correct when the group attachment name or subgroup attachment name is the same as a subsystem name. Incorrect IEFSSNxx definitions might be troublesome if you have inactive subsystems that are still defined but not used.

Assume you have the following subsystem definitions on a z/OS system:

```
DB2A,DSN3INI,'DSN3EPX,-DB2A,S' ←Inactive subsystem
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB2A' ←Active subsystem
```

The jobs that are submitted on this z/OS system try to connect to the name DB2A. DB2 tries to connect to subsystem DB2A before considering group attachment processing. However, because DB2A is not started and it lacks a group attachment name, DB2 does not invoke group attachment processing and find DB1A as you might have intended. To avoid this situation, include the group attachment name in the definition of DB2A, or remove entry IEFSSNxx for subsystem DB2A if it is obsolete. With DB2A defined as the group attachment name for subsystem DB2A, DB2 tries to attach to DB1A after it discovers that DB2A is not started.

Alternatively, you might want a job to connect to a specific subsystem, but it connects to another subsystem in the group instead.

Assume that you have the following subsystem definitions on a z/OS system:

```
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB1A' ←Inactive subsystem
DB2A,DSN3INI,'DSN3EPX,-DB2A,S,DB1A' ←Inactive subsystem
DB3A,DSN3INI,'DSN3EPX,-DB3A,S,DB1A' ←Active subsystem
```

Notice that DB1A is specified as a subsystem and also as the group attachment name for all three subsystems.

The jobs are submitted on this system with a DB2 connection request that specifies the name DB1A and omits the NOGROUP keyword. DB2 tries to connect to subsystem DB1A, but does not. Instead, DB2 invokes group attachment processing and eventually connects to DB3A, the first active subsystem with the group attachment name. You might have intended that the job connect only to DB1A. To ensure that DB2 connects to subsystem DB1A and no other subsystem, specify NOGROUP in the DB2 connection request to disable group attachment processing. Specify the RETRY keyword in the request to indicate the number of times, at 30-second intervals, that DB2 will try to connect to DB1A again.

#### **Related tasks:**

Registering the command prefixes, member group attachment name, and subgroup attachment name

## Member names

Member names include the individual DB2 member (subsystem) name and its associated z/OS subsystem name, procedure names, and BSDS and log names. Member names must be unique within the data sharing group or, in certain cases, the z/OS Parallel Sysplex.

The following names are considered member names:

### Member name

The name of an individual member of a data sharing group. A member name can be up to eight characters long, and it can consist of the characters A-Z, 0-9, \$, #, and @. DB2 uses this name to form its z/OS cross-system coupling facility (XCF) member name. This name must be unique within the data sharing group. If the member name is also used as the high level qualifier for the member's data sets (BSDS, logs, and so on), member names must be unique within the z/OS Parallel Sysplex. This is because the z/OS Parallel Sysplex can have a shared master catalog. An example of a member name is DB1A.

### DB2 subsystem name

The name of a DB2 subsystem that is a member of a data sharing group. This name is used by all the attachment interfaces. A DB2 subsystem name can be up to four characters long, and it must be unique within the Parallel Sysplex. The member name and the DB2 subsystem name should be the same. An example of a DB2 subsystem name is DB1A.

### Location alias name

This name can represent one, several, or all members of a data sharing group. A location alias name enables you to define subsets of data sharing group members. Subsetting gives you the ability to limit the members to which DRDA requesters can connect.

### Member LU name

The network name of an individual member of a data sharing group. A logical unit (LU) name must be unique both within the group and within the network. This name can be up to eight characters long.

### Member domain name

This name lets DB2 handle indoubt thread resolution for TCP/IP connections.

### Network Address

The member DVIPA and port number. It can be either an IPv4 address, an IPv6 address, or both. The TCP/IP port number that is used by the distributed data facility (DDF) to accept incoming DRDA two-phase commit resynchronization requests, if the data sharing group uses TCP/IP. Each member of a data sharing group listens on a unique resynchronization port.

### Member IPv4 Address

A constant IPv4 address to be associated with the data sharing member.

### Member IPv6 Address

A constant IPv6 address to be associated with the data sharing member.

### Command prefix

The prefix that directs commands entered at a z/OS console to a particular member of a data sharing group. The command prefix can be up to eight



characters long and the first character must be a special character. The default prefix is the concatenation of the hyphen character (-) with the DB2 subsystem name.

This string is specified as a parameter on the IEFSSNxx subsystem definition. An example of a command prefix is -DB1A. You can have blanks between the command prefix and the command.

Do not assign a command prefix that is used by another DB2 subsystem or that can be interpreted as belonging to more than one DB2 subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix starting from the first character. For example, it is invalid to assign a hyphen (-) to one DB2 subsystem and '-DB2A' to another DB2 subsystem. Similarly, it is invalid to assign '?DB2' to one DB2 subsystem and '?DB2A' to another DB2 subsystem. It is valid, for example, to assign '-DB2A' and '-DB3A' to different DB2 subsystems.

### Work file database

The name of the work file database that is associated with a member of the data sharing group. Each member has its own work file database. In a non-data sharing environment, a DB2 subsystem's work file database is called DSNDB07. In a data sharing environment, although one member of the group can have a work file database with the name DSNDB07, you might want to create one with a more meaningful name, such as WRKDB1A, for member DB1A. This name can be up to eight characters long.

Work file data sets have names of the format *catalias.DSNDBC.mworkdb.DSNkknn.y0001.A001*, where *y* can be either I or J.

**Restriction:** You cannot specify a work file database name that begins with DSNDB unless the name is DSNDB07.

### Load module for subsystem parameters

The name of the load module that contains a member's subsystem parameters. Each member has its own subsystem parameters. The load module resides in SDSNEXIT. The name is specified as a parameter on *mssnMSTR* procedure.

The load module name can be up to eight characters long. An example name is DSNZP01A, a naming convention that you can use to associate member DB1A with DSNZP01A.

**Choosing names for member data sets:** When choosing names for member data sets, remember that data set names beginning with *membname* must have a master catalog alias to point to the catalog where the data sets are cataloged. The DB2 installation process does not create this catalog alias. One way to handle this is to begin member data set names with *catalias* and a member-related qualifier. For example, member data set names could take the form *catalias.membname.xxxxx*. This format eliminates the need to have a master catalog alias for *membname*.

### Member BSDS names

The names of bootstrap data sets (BSDS) belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These names can be up to 33 characters long. Example BSDS names are DSNDB0A.DB1A.BSDS01 and DSNDB0A.DB1A.BSDS02.

### Active log data set prefixes

The prefixes of active log data sets belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These prefixes can be up to 30 characters long. Example active log data set prefixes are DSNDB0A.DB1A.LOGCOPY1 and DSNDB0A.DB1A.LOGCOPY2.

### Archive log data set prefixes

The prefixes of archive log data sets belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These prefixes can be up to 35 characters long unless you want the data sets timestamped. If they are timestamped, these prefixes can be up to only 19 characters long. Use the `TIMESTAMP ARCHIVES` parameter of installation panel `DSNTIPH` to specify whether you want the date and time qualifiers to be added to the archive log data set prefix.

Example archive log data set prefixes are DSNDB0A.DB1A.ARC1 and DSNDB0A.DB1A.ARC2.

### SCA and group buffer pool connection names

The connection name is generated by DB2. You see it only in certain commands (`z/OS D XCF,STRUCTURE` and the DB2 connection list display of `DISPLAY GROUPBUFFERPOOL`). The connection name can be up to 16 characters long. An example connection name is `DB2_membername`.


### Procedure names

The procedure names are generated from the member subsystem name at installation. The names can be up to eight characters long. Example procedure names are *mssnMSTR*, *mssnDBM1*, *mssnDIST*, and *mssnSPAS*.

### XCF member name

This is the same as the member name for DB2; thus, a maximum of eight characters is used.

### Related concepts:

 [Group access \(DB2 Data Sharing Planning and Administration\)](#)

### Related tasks:

Choosing names for the local subsystem

Registering the command prefixes, member group attachment name, and subgroup attachment name

### Related reference:

COMMAND PREFIX field

### IRLM names

Each member of a data sharing group has its own IRLM. The IRLM group name, subsystem name, and member ID are parameters on the IRLM startup procedure.

This means that every IRLM in the group must have a separate IRLM procedure. The following figure shows the relationship between DB2 group names and IRLM group names.

DB2 group: DSNDB0A  
IRLM group: DXRDB0A

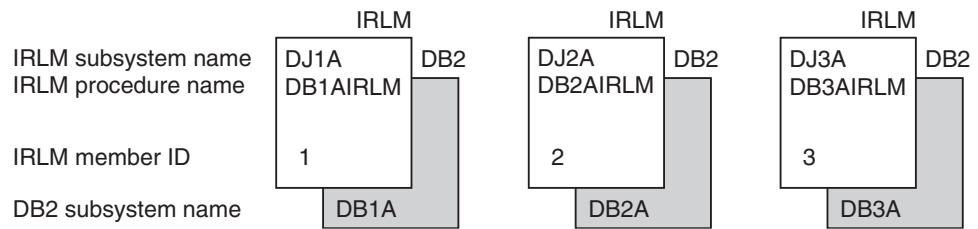


Figure 3. Relationship between DB2 and IRLM group names

You must choose the following IRLM names before installing DB2:

#### IRLM group name

The name that encompasses the entire IRLM group. This name can be up to eight characters long and can consist of the characters A-Z, 0-9, \$, #, and @. The group name must begin with an alphabetic character. The name must be unique across the Parallel Sysplex.

**Restriction:** To avoid names that IBM uses for its XCF groups, do not begin with the letters A-I unless the first three characters are DXR. Do not use the string SYS as the first three characters, and do not use the string UNDESIG as your group name.

The IRLM group name is a parameter (IRLMGRP=) on each member's IRLM procedure. An example IRLM group name is DXRDB0A, a naming convention that you can use to associate member DB0A with DXRDB0A.

#### IRLM subsystem name

Each IRLM must have a subsystem name that must be unique within the data sharing group and can be up to four characters long and. This name is a parameter on the IRLM procedure.

A sample subsystem name is DJ1A. The "1A" characters indicate that this IRLM is paired with the member DB1A.

#### IRLM procedure name

Each member of a data sharing group knows its IRLM by the procedure and subsystem names saved in that member's installation parameter load module. The IRLM procedure name can be up to eight characters long.

**Recommendation:** Use the member subsystem name followed by "IRLM." An example IRLM procedure name is DB1AIRLM.

#### IRLM member ID

This ID uniquely names an IRLM within a group. It is a parameter on the IRLM procedure and must be unique within the data sharing group. It is a number between 1 and 255 (inclusive).

The following names also apply to IRLMs:

#### IRLM XCF member name

This name can be up to 16 characters long. An example IRLM XCF member name is *xxxxxxxx\$issnNNN*, where *xxxxxxxx* is the IRLM group name, *issn* is the IRLM subsystem ID, and *NNN* is the IRLM member ID. Dollar signs (\$) are used as padding. This name is generated at startup time.

### Lock structure connection name

The connection name is the same as the IRLM XCF member name. It is generated by IRLM. You see it only as the output of certain commands (such as z/OS D XCF,STRUCTURE). In some cases, the connection name can be of the format *xxxxxxx#issnNNN*.

### Related reference:

 START irlmproc (z/OS IRLM) (DB2 Commands)

### Coupling facility structure names

Names for coupling facility structures must conform to a strict naming convention that is based on the DB2 group name.

Sample names are shown in the following table:

*Table 19. Sample names of coupling facility structures*

Structure type	Example name
Cache structure (group buffer pools)	DSNDB0A_GBP0
Lock structure	DSNDB0A_LOCK1
List structure (shared communications area)	DSNDB0A_SCA

### Group buffer pool names

Use a name of the following format on the CFRM policy to define the group buffer pool to the coupling facility. The name can be up to 16 characters long.

*groupname\_GBPxxxx*

Where *GBPxxxx* is the name of the group buffer pool; the following restrictions apply:

- 4 KB group buffer pools are named GBP0, GBP1, ..., GBP49
- 8 KB group buffer pools are named GBP8K0, GBP8K1, ..., GBP8K9
- 16 KB group buffer pools are named GBP16K0, GBP16K1, ..., GBP16K9
- 32 KB group buffer pools are named GBP32K, GBP32K1, ..., GBP32K9

**Requirement:** You must define GBP0, GBP8K0, GBP16K0, and GBP32K. You must also define any other group buffer pools that you need for your particular data sharing setup.

When DB2 duplexes a group buffer pool structure, the same structure name is used for both the primary and secondary structures. A duplexed structure requires a single CFRM policy structure definition, with one structure name.

### Lock structure name

Use a name of the following format on the CFRM policy to define the lock structure to the coupling facility. The name can be up to 16 characters long.

*groupname\_LOCK1*

### Shared communications area

Use a name of the following format on the CFRM policy to define the SCA to the coupling facility. The name can be up to 16 characters long.

*groupname\_SCA*

## Naming recommendations for a DB2 data sharing environment

Because you must name a large number of items, and you might have to add new members or move existing members to different systems in the future, managing all these items is easier if you choose and maintain a consistent naming convention.

You control the names that you assign to entities during the DB2 installation process. **After installation, you cannot change some names, such as the group name and the member names.**

If you are enabling the originating member of the group from an existing DB2 subsystem, you can build a naming scheme around existing names to reduce the disruption to existing applications. However, before enabling data sharing, you might want to change some names to lay the foundation for a solid naming convention.

Another name to choose carefully is the catalog alias for the group. It is very difficult to change that name. To change the catalog alias for the group, you must bring the entire group down and perform the single-system procedure for every member of the group.

## Configuration assumptions

DB2 data sharing does not require that the Parallel Sysplex has a specific configuration. However, a specific configuration is assumed during the installation process. DB2 data sharing naming recommendations support and the installation process assumes the following z/OS Parallel Sysplex configuration:

- One SYS1.PARMLIB shared by all z/OS systems
- One SYS1.PROCLIB shared by all z/OS systems
- One integrated catalog facility master catalog shared by all z/OS systems

If the z/OS Parallel Sysplex is configured differently, you must customize the installation process. For example, if you use different SYS1.PARMLIBs, make sure that the DB2 data sets are in the APF list in each PARMLIB. If you use different PROCLIBs, modify the JCL to point to the correct libraries during installation. And, if you are using more than one integrated catalog facility (IFI) master catalog, put the DB2 catalog alias in each master catalog.

## Naming convention suggestions

Consider the following suggestions when naming various DB2 entities:

- Name subsystems first.

Subsystem names are limited to four characters, making them the shortest names. After you select subsystem names, use them as the basis for creating other names.

Four-character names are also needed for the following entities:

- DB2 group name; one per data sharing group
- Member name; one for each DB2 subsystem in the group
- IRLM subsystem name; one for each member of the group

One possible naming convention is a Parallel Sysplex-wide approach to naming. This convention assigns subsystem names of the form “*ctmg*” where:

- c* Denotes a particular collection of logically related applications or subsystems.

- t* Denotes a type of resource, such as “B” for DB2 or “J” for IRLM.
- m* Denotes a particular member within a data sharing group or an IRLM group. This identifier also associates a subsystem with its z/OS system for recovery when you use automatic restart.

*g* Denotes a particular DB2 group.

This information uses “A” as the group identifier. Therefore, the naming scheme has a subsystem name of DB1A for the first member of the data sharing group. The second member is DB2A, and so on. The following table shows how the member identifier relates to a particular z/OS system and how the group identifier associates members across a Parallel Sysplex system. In each column are the names that are associated with a particular z/OS recovery group (z/OS2, for example). In each row are the names that are associated with the primary components of the data sharing group, such as DB2 subsystems and IRLM subsystems.

Table 20. Subsystem names in a Parallel Sysplex

z/OS1	z/OS2	z/OS3	z/OS4
DA11 (CICS)	DA21 (CICS)	DA31 (CICS)	DA41 (CICS)
DB1A (DB2)	DB2A (DB2)	DB3A (DB2)	DB4A (DB2)
DJ1A (IRLM)	DJ2A (IRLM)	DJ3A (IRLM)	DJ4A (IRLM)
DD11 (DBCTL)	DD21 (DBCTL)	DD31 (DBCTL)	DD41 (DBCTL)

- If you enable an existing DB2 subsystem to take advantage of data sharing, and existing applications already access that DB2 subsystem, consider using the name of the existing DB2 subsystem as the group attachment name. This strategy allows existing applications continue to use the data sharing member. It does not require any changes to those applications in terms of specifying a new subsystem name.
- Use the same name for the DB2 group name, the DB2 location name, and the DB2 integrated catalog alias.  
A data sharing group uses the same catalog alias name. This catalog alias is used as the high-level qualifier for the DB2 directory (DSNDB01), catalog (DSNDB06), default database (DSNDB04), and work file database VSAM data sets.
- Use the same name for a member's member name and DB2 subsystem name.
- Accept the default prefix for a member's command prefix.

### Example of names for a DB2 data sharing environment

The following table shows example names for a 12-member data sharing group. This example uses the subsystem naming convention that is described above. A zero in place of the member identifier is used to identify a group-wide resource, such as the group name or the catalog alias (DSNDB0A). The letter 'A' indicates that this naming convention is for data sharing group A. You can establish similar naming conventions for other data sharing groups, for example, group DSNDB0B. In the following table, the '#' character is used to denote a character from the set {1- 9,A,B,C}. These characters are used to denote a particular member's name.

Table 21. DB2 data sharing naming example

Entity	Name
DB2 group name	DSNDB0A
ICF catalog alias	DSNDB0A

Table 21. DB2 data sharing naming example (continued)

Entity	Name
Group attachment name	DB0A
Subgroup attachment name	SBG1
Catalog and directory database names	DSNDB0A.DSNDB01 and DSNDB0A.DSNDB06
Application defaults module	DSNHDECP
Target libraries	DSNDB0A.SDSNCLST DSNDB0A.SDSNLINK DSNDB0A.SDSNLOAD DSNDB0A.SDSNEXIT
Network Address	DOMAIN DSNDB0A.svl.ibm.com AND PORT 446
Group DRDA Port	446
Group Secure DRDA Port	448
Location name	STLEC1
Generic LU name	USIBMSY.SYEC1GLU
Parallel Sysplex domain name	DSNDB0A.svl.ibm.com
Group IPv4 Address	1.1.1.1
Group IPv6 Address	1.1.1.1.1.1.1.1
Member name	DB#A
DB2 subsystem name	DB#A
Location alias name	ALIAS1
Member LU name	LUDB2LA
Member domain name	DSNDB0A.svl.ibm.com
Network address	DOMAIN DSNDB0A.svl.ibm.com AND PORT 5001
Resync Port	5001
Member IPv4 Address	2.2.2.2
Member IPv6 Address	2.2.2.2.2.2.2.2
Command prefix	-DB#A
Work file database	WRKDB#A
Load module for subsystem parameters	DSNZP0#A
Member BSDS names	DSNDB0A.DB#A.BSDS01 DSNDB0A.DB#A.BSDS02
Active log data set prefixes	DSNDB0A.DB#A.LOGCOPY1 DSNDB0A.DB#A.LOGCOPY2
Archive log data set prefixes	DSNDB0A.DB#A.ARC1 DSNDB0A.DB#A.ARC2
SCA and group buffer pool connection names	DB2_DB#A

Table 21. DB2 data sharing naming example (continued)

Entity	Name
Procedure names	DB#AMSTR DB#ADBMI DB#ADIST DB#ASPAS
XCF member name	DB0A
IRLM group name	DXRDB0A
IRLM subsystem name	DJ#A
IRLM procedure name	DB#AIRLM
IRLM member ID	Number 1-12 corresponding to #
IRLM XCF member name	DXRDB0A\$\$DJ#A12
Lock structure connection name	DXRDB0A\$\$DJ#A12
Cache structure (group buffer pools)	DSNDB0A_GBP0
Lock structure	DSNDB0A_LOCK1
List structure (shared communications area)	DSNDB0A_SCA

### Distributed naming conventions

The example above does not include names for distributed processing. Those naming conventions will probably be part of a much broader convention. See your network administrator for more information about choosing names for distributed access.

#### Related tasks:

- Renaming a member by performing an IPL
- Renaming a member by stopping DB2

## Planning for availability in a data sharing environment

When planning your data sharing configuration for the highest availability, the physical protection of the coupling facility and the structures within the coupling facility, as well as the highest network connectivity, are the primary concerns. The SCA and lock structure are both necessary for the group to function.

### About this task

To plan for the highest availability:

#### Procedure

1. Duplex the group buffer pool to allow DB2 to switch to the secondary structure if the primary structure fails.

Although the loss of a group buffer pool does not require a group restart, availability for users and important applications requires that data in a group buffer pool be available as quickly as possible after failure. Group buffer pools have several availability options, depending on the type of failure that occurs. Duplexing group buffer pool structures assures minimal impact on performance. Duplexing can also help you to avoid hours of recovery time, which are often required to recover simplex group buffer pool structures.

If a simplex group buffer pool structure fails, the group buffer pool can be recovered automatically from data in the DB2 logs. If members lose



connectivity to the group buffer pool, the group buffer pool can be rebuilt in another coupling facility to which the members can connect. Recovering data from the DB2 logs and rebuilding structures in another coupling facility can be very time-consuming.

2. Configure a simplex SCA and lock structure in failure-isolated coupling facilities. (When duplexed, the SCA and lock structure do not need to be in failure-isolated coupling facilities.)

Duplexing the SCA and lock structure offers marginally faster recovery times compared to dynamically rebuilding a simplex SCA and lock structure. Duplexing also enables you to use internal coupling facilities (ICFs), which provide cost savings over stand-alone coupling facilities without compromising availability. However, before you decide to duplex the SCA and lock structure, you should consider that:

- Duplexing the SCA and lock structure does not add significant availability, because the structures can be rebuilt very quickly from in-memory data.
  - Duplexing the SCA and lock structure can cause a significant impact on performance. In most cases, the overhead that is incurred by duplexing these structures outweighs the availability benefits of duplexing.
3. Define a dynamic virtual IP address (DVIPA) for the DB2 group and a DVIPA for each DB2 member in the group. DVIPA addressing gives you the ability to assign a specific virtual IP address to a data sharing group and to each member of the group. This address is independent of any specific TCP/IP stack within the Parallel Sysplex. Even if a member is moved to another z/OS system, as in the case of a failure or maintenance, the member remains accessible and retains the same virtual IP address.
    - To achieve the highest level of application availability at the database level, route connections using the DB2 Universal JDBC Driver or DB2 Connect Server with connection concentrator and Sysplex Workload Balancing support enabled. To route all connections through a DB2 Connect™ Server with Sysplex support enabled, you must first configure the DB2 group and each DB2 member to use DVIPA. The DB2 Connect Server then manages the connections to the group using the DVIPAs.
    - To support JTA and JTS distributed transactions, the DB2 Universal JDBC Driver and the WebSphere Application Server can be used to coordinate commits against a data sharing group. If using the DB2 Universal JDBC Driver, group and member DVIPA need to be configured in order to recover indoubt threads after a system failure.

## **Automatic restart of z/OS**

The purpose of automatic restart is to reduce the amount of time that a particular system is down.

When DB2 or IRLM stops abnormally, the surviving z/OS systems analyze the situation to determine whether z/OS failed too, and where DB2 or IRLM should be restarted. If z/OS did not fail, then DB2 or IRLM is restarted on the same z/OS image. If z/OS failed, then DB2 or IRLM is restarted on another z/OS image.

Automatic Restart Manager (ARM) is the component of z/OS that manages automatic restarts.

### **Advantage of automatic restart:**

When DB2 and IRLM restart automatically, locks that are held by failed members are released quickly.

Applications that are running on other members can then access data for which the failed member is holding incompatible locks. Consider using automatic restart in conjunction with the RETAINED LOCK TIMEOUT option of installation panel DSNTIPI.

You must install DB2 with a command prefix scope of “started” to take advantage of automatic restart.

**Related concepts:**

The scope and uniqueness of DB2 subsystem parameters in data sharing

**Related tasks:**

Registering the command prefixes, member group attachment name, and subgroup attachment name

**Automatic restart policies:**

You control how automatic restart works by using z/OS automatic restart policies.

When the automatic restart function is active, the default action (for both sharing and non-sharing DB2 subsystems and IRLMs) is to restart the subsystems when they fail. If this default action is not what you want, you must create a policy that defines the action that you want to be taken.

**Creating an automatic restart policy:**

If the default action of restarting DB2 and IRLM is the action that you want, you do not need to create an automatic restart policy.

**Before you begin**

If you do want to change the default restart behavior of DB2 or IRLM, you need to know the automatic restart element name.

In a data sharing group, the DB2 element name is the DB2 group name concatenated with the member name (such as DSNDB0ADB1A).

For IRLM, the element name is the IRLM group name concatenated with the IRLM subsystem name and three-character member ID (such as DXRDB0ADJ1A001).

You can also specify a pattern-matching character (such as DSNDB0A\*) if you want to use a single policy statement for all members in the group.

**About this task**

DB2 startup can be a little faster when Automatic Restart Manager (ARM) restarts IRLM because this activity is done in parallel. DB2 does not have to start IRLM and wait. However, if you do not want IRLM to automatically restart after a failure, you can modify the IRLM element.

You can also tailor the restart policy to use restart light. Restart light enables DB2 to restart with a minimal storage footprint to quickly release retained locks and then terminate normally. It is not recommended for a restart in place, but it is recommended for a cross-system restart in the event of a failed z/OS system. It is primarily intended to restart DB2 temporarily on another z/OS system that does not have the capacity to sustain a DB2 and IRLM pair. ARM will not restart this member again when it comes down after performing a restart light.

## Procedure

To create an automatic restart policy:

Create an ARM policy with one or both of the following specifications as needed for your system.

- To specify that DB2 or IRLM is not to be restarted after a failure:

Include RESTART\_ATTEMPTS(0) in the policy for that DB2 or IRLM element.

For IRLM, you can also use the MODIFY `irlmproc,ABEND` command, as shown below, to stop IRLM and unregister it from ARM when it comes down.

Unregistering prevents IRLM from automatically restarting after you bring it down.

```
MODIFY irlmproc,ABEND,NODUMP
```

However, if a member's AUTO START option of installation panel DSNTIPI has a value of YES, and if z/OS restarts DB2 automatically, DB2 restarts IRLM, too.

- To have DB2 restarted in a light mode (restart light):

Modify the ARM policy for the DB2 group to specify LIGHT(YES) or

LIGHT(NOINDOUBTS) within the RESTART\_METHOD(SYSTEM) keyword for the DB2 element name. For example:

```
RESTART_METHOD(SYSTEM,STC,'cmdprfx STA DB2,LIGHT(YES)')
```

## Coupling facility availability

For high availability, you should have at least two coupling facilities, and at least one of them should be non-volatile.

With multiple coupling facilities, you can specify that structures be allocated in the secondary coupling facility, if the primary coupling facility is damaged. You can also consider duplexing SCA, lock, and group buffer pool structures. With duplexing, a secondary structure is always on standby in another coupling facility. This secondary structure is ready to take over if the primary structure fails or if a connectivity failure occurs. If you have three or more coupling facilities, you can even maintain duplexing while performing maintenance on one of the coupling facilities.

Duplexing the group buffer pool structures is a good idea because the performance overhead of duplexed group buffer pools are negligible in most cases, and the availability benefits are very high. Duplexing the SCA and lock structure is not as important for high availability because these structures can be rebuilt dynamically on an alternate coupling facility, if the coupling facility that contains the SCA and lock structure fails.

If the SCA and lock structure are not duplexed, the coupling facility that contains these structures should be failure isolated for the highest availability. A *failure-isolated CF* resides in a central processor complex (CPC) that does not also contain a data sharing member that is connected to structures in that coupling facility. If the SCA and lock structure reside in a *non-failure-isolated coupling facility* (a coupling facility that contains the SCA and lock structure and resides in a CPC that also contains a member of that data sharing group), the CPC becomes a single point of failure. If the CPC fails, the entire data sharing group comes down. Duplexing the SCA and lock structure, or keeping the SCA and lock structure in a failure-isolated coupling facility, avoids this single point of failure.

### Related concepts:

Duplexed structures

### Related reference:

🔗 [Achieving the Highest Levels of Parallel Sysplex Availability \(IBM Redbooks\)](#)

🔗 [z/OS Parallel Sysplex Configuration Overview \(IBM Redbooks\)](#)

### **Recommendations for placement of coupling facilities:**

Physically separate the coupling facilities from each other and from the rest of the z/OS images that use those coupling facilities.

If you separate the SCA and lock structures from the systems that use them, you can minimize the chances of performing a lengthy group restart after a lengthy outage.

Quick recovery of the group buffer pools uses information in the lock structure and SCA to determine which databases must be recovered. This is known as *damage assessment*. Consider putting the lock structure and SCA in a coupling facility that does not contain important cache structures (such as group buffer pool 0). You are less likely to lose the SCA, lock structure, and the group buffer pool at the same time if you carefully separate these structures by placing them in different coupling facilities.

If you lose the lock structure or SCA at the same time as one or more group buffer pools, DB2 waits until the lock structure and SCA are rebuilt before doing damage assessment.

### **Preparations for coupling facility failures:**

If structure failures occur, DB2 can recover resources in the structures.

The major types of coupling facility failures are structure failures, connectivity failures, and channel failures:

- A structure failure occurs when a group buffer pool, lock, or SCA structure no longer operates.
- A connectivity failure is a total failure of the coupling facility, such as a power failure to the coupling facility or some problem with the coupling facility control code.
- A channel failure occurs when a channel connecting a CPC to a coupling facility no longer operates.

**Recommendation:** To ensure high availability when preparing for structure and connectivity failures, configure the group buffer pool structures in duplex mode and the SCA and lock structures in simplex mode. To prepare for channel failures, consider using dual channels between each CPC and a coupling facility.

### **Duplexed group buffer pool structure failures:**

If a duplexed group buffer pool structure fails, the failing structure is deallocated, and processing continues with the running structure.

This recovery is usually fast and unnoticeable. In case both structures fail, use checkpointing.

### **Related concepts:**

Simplex group buffer pool structure failures

➡ How DB2 gathers checkpoint information (DB2 Data Sharing Planning and Administration)

### **Simplex group buffer pool structure failures:**

Simplex group buffer pools can be recovered from the log when they fail.

Recovery from the log can occur manually, as the result of a `START DATABASE` command, or it can occur automatically because the group buffer pool is defined with the `AUTOREC(YES)` option. In either case, to reduce the time that is needed for group buffer pool recovery, use the `ALTER GROUPBUFFERPOOL` command to make group buffer pool checkpoints more frequent. However, weigh the benefit of faster recovery with the processing resources that are used for the checkpointing. (You can reduce checkpoint costs considerably when z/OS is at the appropriate level of maintenance.

Ensure that you specify one or more alternate coupling facilities in the CFRM preference list for the group buffer pools because a group buffer pool can be allocated in an alternative coupling facility when a new connection is made to it.

#### **Related concepts:**

➡ How DB2 gathers checkpoint information (DB2 Data Sharing Planning and Administration)

➡ Problem: Loss of group buffer pool structure (non-duplexed) (DB2 Data Sharing Planning and Administration)

### **Automatic recovery requirements:**

Automatic recovery is faster than manual recovery because DB2 can optimize internal processing of the recovery.

For automatic recovery to be initiated for a group buffer pool, all of the following conditions must be true:

- `AUTOREC (YES)` is specified for the group buffer pool.
- At least one member is actively connected at the time that the group buffer pool failed. This member must have successfully completed damage assessment.

DB2 never initiates automatic recovery during restart.

For a duplexed group buffer pool, DB2 can use automatic recovery if both instances of the group buffer pool are damaged. Automatic recovery is not needed for group buffer pools that are defined as `GBPCACHE (NO)`.

You can enable automatic recovery with the `AUTOREC` option of the `ALTER GROUPBUFFERPOOL` command.

### **Simplex SCA and lock structure failures:**

To recover a simplex SCA and lock structure, DB2 uses information that is contained in its virtual storage to quickly rebuild the structures.

This recovery has a minimal impact on performance. DB2 can rebuild a simplex SCA and lock structure in the same coupling facility or in an alternate coupling facility, assuming that the following conditions are true:

- You specified the alternate coupling facility in the CFRM policy preference list.

- You allocated enough storage in the alternate coupling facility to rebuild the structures there.


If DB2 fails to rebuild the SCA and lock structure from virtual storage, all active members in the group terminate abnormally, and you must perform a group restart to recover the necessary information from the logs.

#### **Duplexed SCA and lock structure failures:**

If a duplexed SCA or lock structure fails, the failing structure is deallocated, and processing continues on the running structure.

**Important:** To enable DB2 to switch to the secondary SCA and lock structure, the CFRM policy for the structures must indicate that duplexing is allowed, and the SCA and lock structure must currently be running in duplexed mode.

#### **Related reference:**


 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

#### **Preparations for connectivity failures:**

DB2 and z/OS interpret a total failure of the coupling facility as a connectivity failure.

Connectivity failures include such issues as power failures to the coupling facility or a problem with coupling facility control code.

#### **Related concepts:**


 [Problem: loss of coupling facility \(CF\) \(DB2 Data Sharing Planning and Administration\)](#)

#### **Preparations for coupling facility channel failure:**

To prevent a failure to DB2 that is caused by a coupling facility channel failure, consider using dual channels between each CPC and a coupling facility.

Without dual channels (sometimes called *links*), a channel failure is more likely to occur than a failure in the coupling facility. Losing connectivity to the SCA or lock structure can bring that particular member down, unless you specify duplexing or an alternative coupling facility in the CFRM policy preference list.

#### **Related reference:**

 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

#### **How structures are rebuilt when connectivity is lost:**

As with structure failures, DB2 can recover quickly from connectivity failures if group buffer pool structures are duplexed, and if the SCA and lock structure are simplexed.

#### **Recovering from connectivity failures with duplexed structures**

DB2 recovers from connectivity failures with a duplexed group buffer pool, SCA, and lock structure by switching to the structure with good connectivity.

## Recovering from connectivity failures with simplex structures

DB2 recovers from connectivity failures with a simplex group buffer pool, SCA, and lock structure as described below. Be aware that recovery of a simplex SCA and lock structure is fast and has little or no impact on performance, but recovery of simplex group buffer pool structures is very disruptive to the system.

When connectivity is lost, DB2 rebuilds simplex structures on the alternate coupling facility that is specified in the CFRM policy. In rebuilding these structures, DB2 attempts to allocate storage on the alternate coupling facility. DB2 uses the current size of the structure for the initial size of the structure on the alternate coupling facility. If DB2 cannot allocate the storage for the SCA or lock structure, the rebuild fails. If z/OS cannot allocate the storage for the group buffer pools, the changed pages are written to disk.

### Related concepts:

➞ Failure scenarios (DB2 Data Sharing Planning and Administration)

➞ Problem: a subset of members have lost connectivity (non-duplexed) (DB2 Data Sharing Planning and Administration)

*Specifying when structure rebuilds occur after connectivity is lost:*

The *rebuild threshold* is a percentage that you specify for the REBUILDPERCENT parameter in the CFRM policy. z/OS uses the REBUILDPERCENT value to determine whether to initiate a structure rebuild in the case of a loss of connectivity to the coupling facility that contains the structure.

### About this task

The percentage is based on the Sysplex failure management (SFM) weights of all the systems that have active connections to a structure at the time. (A connection is considered active even if connectivity is lost.) You also specify weights on the SFM policy.

z/OS calculates the total weight of:

- All systems that have active connections but that lost connectivity to the structure (A)
- All systems that have active connections to the structure (B)

z/OS then divides A by B and compares the result to the REBUILDPERCENT value. (In the case of multiple connections to a structure from a single z/OS system, that system is counted only once. Multiple connections from a single z/OS system exist, for example, when two members reside on the same z/OS system.)

### Procedure

To control when a rebuild occurs:

Specify REBUILDPERCENT values in your CFRM policy.

**Recommendation:** If you have high availability requirements, specify a small REBUILDPERCENT value, and allow the system to rebuild the structure. Specify a larger REBUILDPERCENT value only if you prefer to have a member lose the use of a structure rather than temporarily disrupt all of the members that were using the structure so that the structure can be rebuilt.

## Example


**Example:** All z/OS systems in an eight-member Parallel Sysplex are of equal weight (10), and six of the systems have active connections to the group buffer pool. *A* equals the total weight of all systems that lose connectivity to the group buffer pool. *B* equals the total weight of all systems that have active connections to the group buffer pool. If two of the six systems lose connectivity, the value of *A* is 20, and the value of *B* is 60.

z/OS determines whether to initiate a rebuild as follows:

- If  $(A/B) \times 100$  is greater than or equal to the REBUILDPERCENT value, DB2 rebuilds the structure.
- Otherwise, DB2 does not rebuild the structure. Instead, the affected members disconnect from the group buffer pool.

In this example,  $(20/60) \times 100$  is equal to 33. If the value of REBUILDPERCENT is 35, z/OS does not initiate a rebuild.

### Related reference:

 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

### Rebuild events:

You can monitor a performance class 20 trace (IFCIDs 0267 and 0268) to determine how long a rebuild of a structure takes and the reason for the rebuild.

You can also examine the messages that are returned to the console to monitor a rebuild. The reasons for a rebuild can include:

- Lost connectivity
- Operator command
- Duplexing is being established


### Coupling facility volatility:

When a coupling facility is in a volatile state, data in the coupling facility is not saved in the event of a power failure.

DB2 issues a warning message if allocation occurs in a volatile coupling facility. A change in volatility after allocation does not affect existing structures.

If the coupling facility is configured to be non-volatile (using the proper power backup, such as a battery backup), volatility is generally a transient state that might occur, for example, if you take the battery out. If you lose power to a non-volatile coupling facility, the coupling facility enters power save mode and saves the data that is contained in the structures. When power is returned, you do not need to do a group restart nor recover the data from the structures. For systems that require high availability, non-volatile coupling facilities are recommended.

### Related concepts:

 [When the coupling facility structure fails \(z/OS MVS Setting Up a Sysplex\)](#)



## Duplexed structures

Running some or all of the SCA, lock, and group buffer pool structures in duplex mode is one way to achieve high availability for these structures across many types of failures, including lost connections and damaged structures.

**Important:** Although the SCA and lock structure can run in duplex mode, you should run them in simplex mode. When duplexed, the SCA and lock structure can cause a significant impact on performance. Also, because the SCA and lock structure can be quickly rebuilt, duplexing them does not add significant availability.

**Important:** If you decide to duplex the SCA and lock structure, you must duplex both structures to achieve the availability benefits. Duplexing only the SCA or only the lock structure does not provide any benefit.

### How group buffer pool duplexing works:

With a duplexed group buffer pool structure, two allocations of the same structure use one connection from each member.

Each structure allocation must be in a different coupling facility. z/OS prefers to place the structures in coupling facilities that are failure-isolated from one another.

**Recommendation:** Ensure that at least one of the group buffer pool structures is in a non-volatile coupling facility. If power is lost to both coupling facilities and both coupling facilities are volatile, you must recover the group buffer pool from the logs.

### *Characteristics of primary and secondary structures:*

z/OS commands let you stop and start duplexing, and let you choose which of the duplexed structures is the primary and which is the secondary.

The *primary structure* is the one from which changed data is cast out to disk. DB2 also uses the primary structure to read data, keep track of page-registration, and perform cross-invalidation of pages in the buffer pools of individual members. When changed data is written to the primary structure, it is also written to the *secondary structure*. DB2 uses the secondary structure as a backup. After data is cast out to disk from the primary structure, the data is deleted from the secondary structure.

From a z/OS perspective, duplexing is really an extended rebuild, so z/OS documentation and commands sometimes call the primary structure the *old* structure, and refer to the secondary structure as the *new* structure.

### *Coupling facility storage considerations for duplexing:*

When planning for storage, make the primary and secondary group buffer pool structures the same size.

If your system is properly configured for high availability using a simplexed group buffer pool, you usually do not need extra coupling facility storage for duplexing. For simplexed structures, you must reserve enough spare capacity in the coupling facilities to be able to absorb the structures of any failed coupling facility. With duplexed structures, instead of reserving storage in case of a coupling facility failure, that storage is used by the secondary group buffer pool.

**Example:** Assume that you have 2 coupling facilities, each with 1 GB of memory, for a total of 2 GB of memory. Ensure that the total size of the structures across the 2 coupling facilities does not exceed 1 GB (50% of the total coupling facility storage).

If you configure three or more coupling facilities, you might need an additional coupling facility for duplexing.

**Duplexing requirements:**

To achieve high availability for SCA, lock, and group buffer pool structures across many types of failures, three conditions must be met.


For duplexing to work, the following conditions must be true:

- The CFRM policy preference list for the group buffer pool structure that you want to duplex must contain at least two coupling facilities with a CFLEVEL of 5 or higher. All members of the data sharing group must have physical connectivity to both coupling facilities in which the primary and secondary structures reside.

If you are going to do automatic reduplexing, you need three coupling facilities that are physically connected to members of the data sharing group.

- At least one member must be actively connected to the group buffer pool structure.
- The group buffer pool must be defined with GBPCACHE(YES), the default.

**Related reference:**

 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

**Options for duplexing:**


Options for the CFRM policy allow, enable, or disable duplexing.


The following options are available in the CFRM policy for duplexing of the group buffer pool, SCA, and lock.

*Table 22. Duplexing options in the CFRM policy*


Option	Valid for	Description
DUPLEX(ENABLED)	SCA, group buffer pool, lock	Automatically starts duplexing.
DUPLEX(ALLOWED)	SCA, group buffer pool, lock	Allows duplexing. You must use a command to start duplexing.
DUPLEX(DISABLED)	SCA, group buffer pool, lock	Disables duplexing

**Related tasks:**

 [Starting duplexing for a structure \(DB2 Data Sharing Planning and Administration\)](#)

 [Stopping duplexing for a structure \(DB2 Data Sharing Planning and Administration\)](#)

**Related reference:**

 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

### **Performance implications of duplexing:**

The process of establishing duplexing can be somewhat disruptive because access to the group buffer pool structure is quiesced while the secondary structure is allocated. Also, changed pages are copied from the primary structure to the secondary structure (or cast out to disk).

Transactions that need access to the group buffer pool structure during this process are suspended until the process is complete. Because of this disruption, you need to establish duplexing at a time of low activity on the system. How long the process takes depends on how many pages are copied to the secondary group buffer pool structure.

In general, more processor and elapsed time is needed to do duplexed group buffer pool structure writes and castout processing than to do simplexed group buffer pool structure writes and castout processing. Workloads that are more update-intensive will probably experience a slight increase in host CPU usage when duplexing is activated. In most cases, the majority of the CPU increase occurs in the DB2 address space. Duplexing can cause a slight increase in the transaction elapsed time. Read performance is unaffected by duplexing.

The statistics and accounting trace classes contain information about structure duplexing.

*Estimating the effect of duplexing on CPU usage:*

When you enable duplexing, you will see an increase in the CPU usage in the coupling facility that contains the secondary structure. Duplexing should have little or no impact on the CPU usage in the coupling facility that contains the primary structure.

### **Procedure**

To estimate approximately how much the coupling facility CPU usage will increase when you establish duplexing:

1. Determine the amount of coupling facility CPU usage that the simplexed primary structure consumes.
2. Divide the result in half to determine how much coupling facility CPU usage the duplexed secondary structure will consume.

### **Duplexing rebuild status:**

When a group buffer pool structure is duplexed, it is considered to be in an extended rebuild status called a duplexing rebuild.

This activity is reported in IFCIDs 0267 and 0268, along with other reasons for rebuilding.

### **DB2 resource availability considerations**

Several options for the catalog and directory, for data in group buffer pools, and for DB2 restart can be used for data that requires high-availability.

DB2 resource availability considerations for a data sharing group are basically the same as for a single DB2 subsystem.

## Critical DB2 data

Critical DB2 data should be placed behind high-availability storage controllers, such as the IBM Enterprise Storage Server®. Consider placing the catalog and directory behind a 3990 control unit with dual-write capability for hardware duplexing. Another possibility is to use storage controllers with high-availability characteristics (such as controllers that use RAID technology) for critical DB2 data.

## Group buffer pool data


Assign data that require high availability to group buffer pools that reside on non-volatile coupling facilities. Use group buffer pool duplexing, which has minimal impact on performance and can avoid hours of recovery time.

## Data availability at restart

For faster restarts, take more frequent checkpoints. Checkpoint frequency is the most important factor in DB2 restart time.

If your installation sometimes has problems with units of recovery (URs) that take a long time to back out after a failure, make plans to reroute work to other members of the group. Another solution is to postpone backout processing for those long-running URs until DB2 is up and receiving new work.

### Related concepts:

 [Postponed backout in a data sharing environment \(DB2 Data Sharing Planning and Administration\)](#)

## XA support for a Sysplex by the IBM Data Server Driver for JDBC and SQLJ

WebSphere Application Server and the IBM Data Server Driver for JDBC and SQLJ can be used to coordinate distributed transactions using XA protocols supported by DRDA.

This type of XA support is only available for transaction managers that use a single-transport processing model. In a single-transport model, a transaction, over a single transport (physical connection), is tied to a member from xa\_start to xa\_end. The transaction end is followed immediately by xa\_prepare(readonly), xa\_prepare plus xa\_commit or xa\_rollback, or xa\_rollback. All of this must occur within a single application process. An example of a transaction manager that uses this model is IBM WebSphere Application Server.

Support for the single-transport processing model also includes indoubt transaction recovery where member information for each recoverable transaction is retrieved through xa\_recover, which allows xa\_commit or xa\_rollback to be directed at the specified member.

**Important:** When a global transaction runs, locks are shared among branches of the global transaction only if those branches run on the same data sharing member. When Sysplex workload balancing is enabled, there is no guarantee that all branches run on the same data sharing member. As a result, an application that uses global transactions and Sysplex workload balancing might experience deadlocks or timeouts.

To use XA support with client applications, you need to set up dynamic virtual IP addresses. A dynamic IP address needs to be configured for the DB2 group, and

one address must be set up for each DB2 member in the group. For XA recovery to be processed on any member after failure, information on indoubt XIDs must be obtained from the SCA. The SCA contains the list of indoubt XIDs for the entire group, as well as each member's DVIPA and the resync port of the member that owns the indoubt thread. XA recovery returns the list of all prepared or heuristically committed threads for the entire group back to the XA Transaction Manager (TM). The IBM Data Server Driver for JDBC and SQLJ uses the information to send the commit decision to the owning member, when the XA TM recovers, and then commits or rolls back indoubt XIDs.

For the recovery process to function properly, you must set up the group DVIPA. The following figure illustrates how the XA recovery process, that is described above, works. After a system failure, XA recover requires the list of indoubt transactions identified by XA XIDs, to be returned to the group. In this example, if member DB1G fails, DB1G will leave an indoubt thread. The state of the thread, as well as related XIDs, is contained in the log of the DB1G member. The DB1G indoubt thread XID is also contained in the group's XA indoubt list, in the SCA. When WebSphere tries to recover from the system failure, the IBM Data Server Driver for JDBC and SQLJ sends the XA Recover command to any member of the group. The member then returns the group's list of indoubt XIDs from reading the XA indoubt list in the SCA. When WebSphere commits or rollbacks the indoubt thread, the IBM Data Server Driver for JDBC and SQLJ sends the decision to member DB1G, which resolves the indoubt thread.

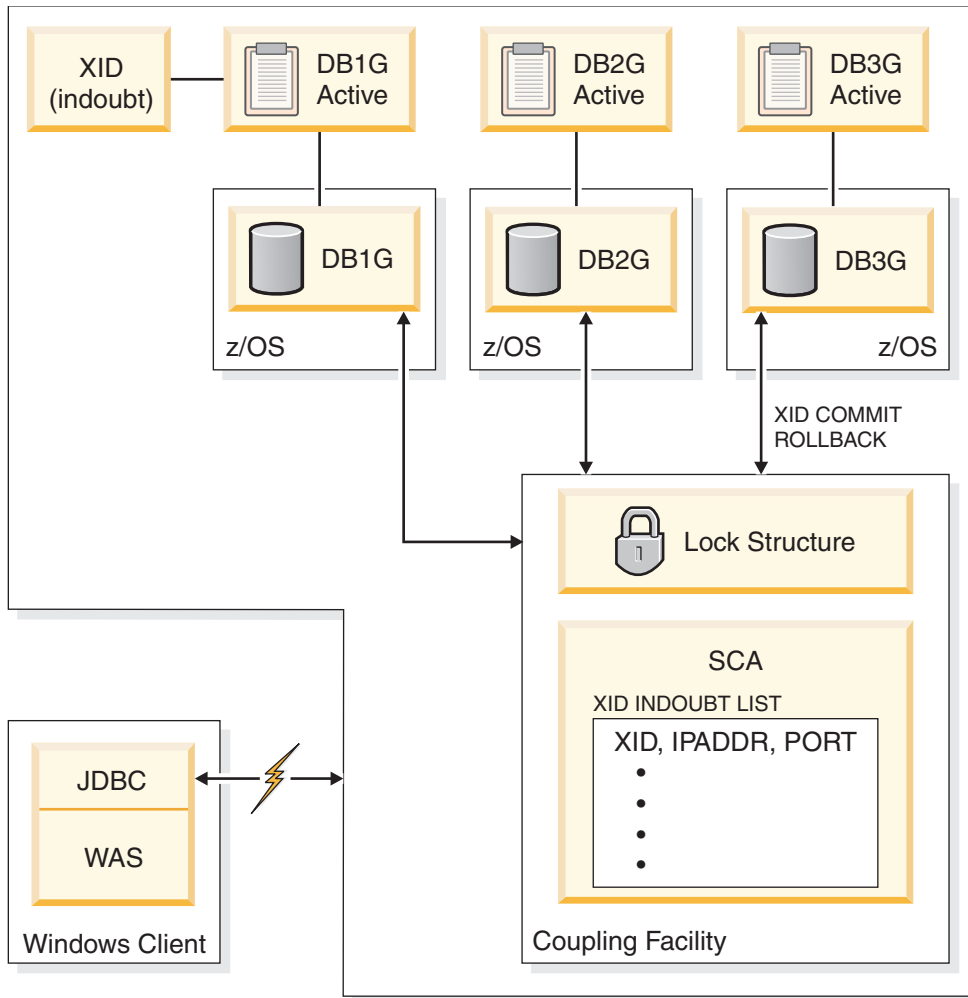


Figure 4. The XA recovery process

**Related concepts:**

➡ Communicating with data sharing groups (DB2 Data Sharing Planning and Administration)

## Storage estimates for data sharing environments

As part of planning for a data sharing environment, you should estimate the storage requirements for coupling facility structures and for DB2 resources.

Precise estimates for the sizes of coupling facility structures are hard to provide. Every environment is different, and storage allocation is affected by the processor model and the level of coupling facility control code. Use the information in this section to estimate initial size (INITSIZE) values. Depending on how much your workload varies, consider specifying a larger value for SIZE.

For duplexed structures, the SIZE and INITSIZE parameter values apply to both instances of the structure.

The information in this section assumes that all page sets in a particular group buffer pool are defined with the same GBPCACHE attribute. You can put page sets with different GBPCACHE attributes in the same group buffer pool, but you must adjust the formulas accordingly.

### **Coupling facility structure size allocation**

When a new coupling facility structure is allocated for a data sharing group, its size is usually taken from the value of the INITSIZE parameter in the CFRM policy.

After the structure is allocated, you can dynamically change its size with the z/OS command `SETXCF START,ALTER,SIZE=newsize,STRNAME=strname`. The new SIZE value cannot be greater than the SIZE value in the CFRM policy, but it can be smaller than the INITSIZE value. If the coupling facility has enough space, z/OS increases (or decreases) the size of the structure to the new size; the INITSIZE value of the policy remains unchanged.

In most cases, DB2 uses the new SIZE value for any subsequent allocations of the structure instead of the INITSIZE value in the CFRM policy. Any of the following subsequent allocations can use the new SIZE value:

- A group buffer pool or SCA is deallocated and then reallocated
- A secondary structure is allocated for a duplexed group buffer pool, SCA, or lock structure, if duplexing is started after the size of the primary structure was dynamically changed
- Any structure is rebuilt with the z/OS command `SETXCF START,REBUILD,STRNAME=strname`

The new size is recorded across a restart of DB2 and is used for all subsequent allocations until one of the following events occurs:

- A CFRM policy is started, and the policy has a different INITSIZE value than the size of the structure that was dynamically changed with the `SETXCF START,ALTER` command
- Another `SETXCF START,ALTER` command is issued to dynamically change the size of the structure

**Exception:** If a lock structure is deallocated and all the members are down, the INITSIZE value is used. This is a consideration for disaster recovery or for situations where data sharing groups are cloned. During normal operation of a data sharing group, you are unlikely to encounter this situation.

#### **Related concepts:**

How to change structure sizes


#### **Coupling facility structure sizer:**

The coupling facility structure sizing tool (CFSizer) simplifies the task of estimating coupling facility structure storage size by asking you questions about your existing or planned configuration.

If you are not sure how to answer the questions, the help functions direct you to the source of the data on your system.

After you decide what your structure sizes are, include those values in the CFRM policy definition. See *Adding MVS systems to a sysplex* for more information about creating CFRM policies.

### Related tasks:

 Determine the size of each coupling facility structure (z/OS MVS Setting Up a Sysplex)

### Recommendations for coupling facility sizes:

Coupling facility structures contain some static control structures. When a structure is initially allocated, these static structures are allocated to accommodate the potential size of the coupling facility structure.

In other words, the size of the static structures is proportional to the maximum size (the value of the SIZE parameter) of the coupling facility structure. If the SIZE value is much larger than the INITSIZE value, a large percentage of the initial structure's size might be used for these static structures, leaving you with little usable storage space in the structure.

**Recommendation:** In general, specify a SIZE value that is larger than the INITSIZE value, but limit the SIZE value in the following ways:

- Limit the SIZE value to no more than two to three times the INITSIZE value for the SCA and lock structure.
- Limit the SIZE value to 1.2 - 1.5 times the INITSIZE value for group buffer pools. The SIZE value should not be more than two times the INITSIZE value.

For example, if the INITSIZE value for a group buffer pool is 100 MB, specify a SIZE value of 200 MB or less.

### Group buffer pool sizes

The two parts of a group buffer pool are data pages and directory entries. You can specify the ratio of data pages to directory entities in a group buffer pool, or you can use the DB2 default ratio.

### Data pages

Data pages (sometimes called *data entries*) reside in the group buffer pool. The size of a data page is the same as the page size supported by the corresponding DB2 buffer pools (4 KB, 8 KB, 16 KB, or 32 KB).

If you are caching changed data only, you need enough space to cache changed data plus extra space for pages that are frequently referenced. By caching those frequently referenced pages in the group buffer pool, you can decrease the amount of time it takes for any member to refresh that page in its member buffer pool because you avoid the disk I/O.

If you choose GBPCACHE NONE or GBPCACHE SYSTEM, no user data pages are actually stored in the group buffer pool. However, with GBPCACHE SYSTEM, space map pages for LOBs are cached in the coupling facility.

### Directory entries

A directory entry specifies the location and status of a page image somewhere in the data sharing group, whether the image is in the group buffer pool or in one of the member buffer pools. Only one directory entry exists for any given page, no matter how many places that page is cached.

The size of a directory entry is approximately 200 bytes, but it varies somewhat based on the size of the data pages and the CFLEVEL you are using.



## Specifying a ratio

The amount of space that is allocated for a group buffer pool is determined by the ratio of directory entries to data pages. When you originally define a structure in the CFRM policy for a group buffer pool, you specify its total size. For DB2, the ratio defaults to five directory entries per data page. Later, you can change the ratio with the ALTER GROUPBUFFERPOOL command. The new value that you define takes effect when the group buffer pool is rebuilt or reallocated.

For group buffer pools that are defined with GBPCACHE(NO), ratios are ignored because no data is actually stored in the group buffer pool.

When possible, both a formula and a general guideline are provided to help you estimate the initial sizes and ratios of your group buffer pools. (The exception is for GBPCACHE ALL group buffer pools, for which only a general guideline is provided.)

The formula is not too complex and is likely to be more accurate, assuming that you are fairly confident of the values for the variables in the formulas. Otherwise, use the general guidelines and then adjust your values from there.

### Related concepts:

[☞](#) Determining the correct size and ratio of group buffer pools (DB2 Data Sharing Planning and Administration)

### Related reference:

[☞](#) zSeries Processor Resource/Systems Manager Planning Guide

### Storage estimate for group buffer pools that cache changed data:

The size of a group buffer pool is related to the amount of sharing and the amount of updating. You can use a formula to estimate the storage size of group buffer pools that cache changed data.

An estimate must be based on the total amount of member buffer pool storage multiplied by a percentage based on the amount of update activity. As data sharing and updating increases, more pages must be cached in the group buffer pool, and more directory entries are needed to track inter-DB2 interest.

### Formula

The following is a formula for estimating storage for group buffer pools that cache changed data:

```
Data_entries = U * D * R
Data(MB)      = Data_entries * P / 1024
Dir_entries   = Data_entries + (U * VP)
Dir(MB)       = 1.1 * Dir_entries * 0.2 / 1024
GBP(MB)       = Data(MB) + Dir(MB)
RATIO         = Dir_entries / Data_entries
```

Where:

**U** The estimated degree of data sharing:

- 1** A high amount of sharing with a lot of update activity
- 0.7** A moderate amount of sharing with a moderate amount of update activity

0.5 A low amount of sharing with a low amount of update activity

**D** The number of data pages written to disk per second for all members during peak activity. Do not use the number of pages written to the group buffer pool; D must be a count of distinct pages. To determine this value, use the field QBSTPCO from IFCID 0002 (the PAGES CASTOUT field of the buffer pool section of the Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS Statistics report.)

**R** The average page residency time in the group buffer pool, in seconds. This value is application-dependent, but you can assume that the typical range is 30 to 180 seconds. If you have no information about residency time, use 120.

**General guideline:** Make R large enough so that other members can refresh an invalidated local copy of a changed page. When a changed page is written to the group buffer pool, it invalidates local copies of the page in other members. The changed page needs to remain resident in the group buffer pool long enough for other members to refresh the page.

**P** The page size (4 KB, 8 KB, 16 KB, or 32 KB).

**VP** The number of data pages defined for the virtual pool (the sum across all of the members).

0.2 The approximate size of a directory entry, in KB.

1.1 The additional storage needed for coupling facility control structures.

**Example:** Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is very high (U=1).
- 500 disk writes per second occur across both members (D=500).
- No information exists about the page residency time (R=120).
- The page size is 4 KB (P=4).
- Member 1 is configured with a virtual pool of 80000 buffers.
- Member 2 is configured with a virtual pool of 40000 buffers (VP=120000).

The calculation is as follows:

```
Data_entries = 1 * 500 * 120 = 60000
Data(MB)     = 60000 * 4 / 1024 = 234 MB
Dir_entries  = 60000 + (1 * 120000) = 180000
Dir(MB)      = 1.1 * 180000 * 0.2 / 1024 = 38 MB
GBP(MB)      = 234 MB + 38 MB = 272 MB
RATIO        = 180000 / 60000 = 3.0
```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 272 MB. Use the ALTER GROUPBUFFERPOOL command to change RATIO to 3.

**General guideline:** For installation planning purposes, you should use the following general guideline as an initial estimate for the size of a DB2 group buffer pool for table spaces, indexes, or partitions that cache only changed data (GBPCACHE(CHANGED)):

Add the local buffer pool storage for this buffer pool number across all the members of the group. Then, multiply this amount by one of these workload factors:

Factor	Condition
10%	For light sharing with a low amount of updating activity
20%	For medium sharing with a moderate amount of update activity
40%	For a high amount of sharing with a lot of update activity

You can run a trace for IFCID 0002 to obtain an estimate of the amount of data sharing in your system. Calculate the "degree of data sharing" by dividing QBGLGG, the number of get pages for group buffer pool-dependent objects, by QBSTGET, the number of get pages. A value that is less than 25% is considered to be light data sharing, a value between 25% and 75% is medium data sharing, and a value greater than 75% is high data sharing.

Remember that the type of workload you run can influence the amount of storage you use. For example, if you have "hot spots" in which updates to a single page are frequent rather than spread throughout the table space, you might need less storage for caching.

**Example:** Assume that the total buffer pool storage for all the members of the group is 400 MB, and you expect a medium amount of read/write sharing in the environment. The following calculation is an estimate for the size of a group buffer pool when GBPCACHE(CHANGED):

$$400 \text{ MB} \times 20\% = 80 \text{ MB}$$

#### Storage estimate for caching all data:

For installation planning purposes, you can use an initial size estimate of a group buffer pool that caches read-only pages with changed pages (GBPCACHE(ALL)).

Calculate the sum of the local buffer pool storage for this buffer pool number (virtual only) across all members in the group. Then, multiply this amount by one of these workload factors:

Factor	Condition
50%	Less than half of the table spaces, indexes, or partitions specify GBPCACHE ALL
75%	Half of the table spaces, indexes, or partitions specify GBPCACHE ALL
100%	75% or more of the table spaces, indexes, or partitions specify GBPCACHE ALL for a high sharing environment

**Example:** Assume that the local buffer pool storage on all members of the group adds up to 200 MB. Half of the page sets that come into the pool are defined as GBPCACHE(ALL). The following calculation is an estimate for the size of a group buffer pool when GBPCACHE(ALL):

$$200 \text{ MB} \times 75\% = 150 \text{ MB}$$

#### Storage estimate for caching no data:

For planning purposes, you can use a formula to estimate the size of group buffer pools that cache no data.

The following is a formula for estimating storage for group buffer pools that cache no data (GBPCACHE(NO)):

```
Dir_entries = U * VP
Dir(MB)     = 1.1 * Dir_entries * 0.2 / 1024
GBP(MB)     = Dir(MB)
RATIO       = n/a
```

If the group buffer pool itself is defined with GBPCACHE(NO), the ratio is ignored.

In summary, the variables are:

- U** The estimated degree of data sharing.
- P** The page size (4 KB, 8 KB, 16 KB, or 32 KB).
- VP** The number of data pages defined for the virtual pool (the sum across all the members).

**Example:** Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is very high (U=1).
- Member 1 is configured with a virtual pool of 80000 buffers.
- Member 2 is configured with a virtual pool of 40000 buffers (VP=120000).

The calculation is as follows:

```
Dir_entries = 1 * 120000 = 120000
Dir(MB)     = 1.1 * 120000 * 0.2 / 1024 = 25 MB
GBP(MB)     = 25 MB
```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 25 MB. Use the command ALTER GROUPBUFFERPOOL to change the GBPCACHE attribute to NO. If you put GBPCACHE NONE page sets in a GBPCACHE(YES) group buffer pool, the calculation becomes more complicated. You do this because the RATIO is observed and you are probably going to waste a lot of space on unneeded data entries.

#### **Related concepts:**

Storage estimate for group buffer pools that cache changed data

#### **Storage estimate for caching LOB space maps (GBPCACHE SYSTEM):**

For planning purposes, you can use a formula to estimate storage for group buffer pools that cache LOB space map data.

The following is a formula for estimating storage for group buffer pools that cache LOB space map data:

```
Data_entries = (U * D / 10) * R
Data(MB)     = Data_entries * P / 1024
Dir_entries  = Data_entries + (U * VP)
Dir(MB)      = 1.1 * Dir_entries * 0.2 / 1024
GBP(MB)      = Data(MB) + Dir(MB)
RATIO        = MIN(Dir_entries / Data_entries, 255)
```

In summary, the variables are:

- U** The estimated degree of data sharing.
- D** The number of data pages that are written to disk per second for all

members during peak activity. Do not use the number of pages that are written to the group buffer pool; D must be a count of distinct pages. To determine this value, use the field QBSTPWS from IFCID 0002 (the PAGES WRITTEN field of the buffer pool section of the Tivoli OMEGAMON XE for DB2 Performance Expert on z/OSStatistics report).

- 10** An estimate of the LOB system pages that are written for every LOB data page.
- P** The page size (4 KB, 8 KB, 16 KB, or 32 KB).
- R** The average page residency time in the group buffer pool in seconds.
- VP** The number of data pages that are defined for the virtual pool (the sum across all the members).

**Example:** Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is moderate (U=.7).
- 10 disk writes per second occur across both members during peak activity (D=10).
- The space map page is resident in the group buffer pool page for 120 seconds (R=120).
- The page size is 32 KB (P=32).
- Member 1 is configured with a virtual pool of 20000 buffers.
- Member 2 is configured with a virtual pool of 10000 buffers (VP=30000).

The calculation is as follows:

```
Data_entries = ((.7 * 10) / 10) * 120 = 84
Data(MB)      = 84 * 32 / 1024 = 2.6 MB
Dir_entries   = 84 + (.7 * 30000) = 21084
Dir(MB)       = 1.1 * 21084 * 0.2 / 1024 = 4.5 MB
GBP(MB)       = 2.6 MB + 4.5 MB = 7.1 MB
RATIO         = MIN (21084 / 84, 255) = 251
```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 7.1 MB. The ratio is less than the maximum value, so use the command ALTER GROUPBUFFERPOOL to change the ratio to 251.

**Related concepts:**

Storage estimate for group buffer pools that cache changed data

**Related reference:**

 -ALTER GROUPBUFFERPOOL (DB2) (DB2 Commands)

**PR/SM formulas for calculating sizes of group buffer pools:**

You can use Processor Resource/System Manager (PR/SM™) formulas to calculate the sizes of group buffer pools.

You can also calculate group buffer pool sizes by using the coupling facility allocation formulas for cache structures found in zSeries Processor Resource/Systems Manager Planning Guide. The following table contains information that is used in those formulas. The size of cache structures in DB2 can vary greatly based on the amount of data for which inter-DB2 read/write interest exists at any given time. You probably need to monitor the use of the group buffer pools and adjust their sizes accordingly.

Table 23. Information for calculating cache structure sizes

Parameter	DB2 Value	Explanation
MSC	1	Maximum storage class
MCC	1024	Maximum castout class
MDAS	Dependent on page size being cached: 1 for 4 KB pages 2 for 8 KB pages 4 for 16 KB pages 8 for 32 KB pages	Maximum data area size
DAEX	4	Data area element characteristic
AAI	0	Adjunct assignment indicator
R_de	Set on ALTER GROUPBUFFERPOOL. Default is 5. See the table below for more information on determining this value.	The directory portion of the directory-to-data ratio
R_data	Set on ALTER GROUPBUFFERPOOL command. See the table below for more information on determining this value.	The data object portion of the target directory-to-data ratio

The following table contains information about the formulas used to determine R\_data and R\_de. N is the RATIO entered on the ALTER GROUPBUFFERPOOL command. If N has a decimal point, all digits after the first decimal place are ignored. For example, 5.67 is treated as 5.6.

Table 24. Formulas for determining R\_data and R\_de.

Page Size	N has no decimal point	N has decimal point
4 KB R_de	N	$N \times 10$
4 KB R_data	1	10
8 KB R_de	N	$N \times 10$
8 KB R_data	2	20
16 KB R_de	N	$N \times 10$
8 KB R_data	4	40
32 KB R_de	N	$N \times 10$
32 KB R_data	8	80

**Related reference:**

 -ALTER BUFFERPOOL (DB2) (DB2 Commands)

**Lock structure size**

The coupling facility lock structure contains two parts: a lock entry table and a list of update locks.

The *lock entry table* is used to determine if inter-DB2 read/write interest exists on a particular hash class. *Hash classes* are resources that hash to a particular place in the lock table. The second part is a list of the update locks that are currently held (sometimes called a *modify lock list* or *record list table*). You can control the division

of the lock structure storage between these two components by using the IRLMPROC or by using an IRLM MODIFY command. If you do not specify how the structure is to be split, IRLM attempts to divide it with a 1:1 ratio between lock table entry (LTE) and record list entry (RLE) storage.

The total size of the lock structure must be large enough to limit hash contention, which prevents performance problems. The lock structure must also be large enough to prevent failures that result from a lack of record table storage to write a MODIFY entry (RLE). Proper specification for the number of LTEs can help avoid hash contention.

IRLM reserves 10% of the record table entries for “must complete” functions (such as rollback or commit processing), so that a shortage of storage does not cause a member to fail. However, if storage runs short in the record table, there can be an impact on availability (transactions are terminated), response time, and throughput.

The z/OS system can automatically alter the size of a lock structure in the coupling facility if it needs storage space. The ALLOWAUTOALT option in the CFRM policy specifies whether system-initiated automatic alters are to be allowed for a structure.

If no competing resource is using the coupling facility, consider specifying ALLOWAUTOALT(YES) to enable the lock structure to change as the workload grows. However, if you use this setting, other resources can force the IRLM lock structure size to decrease. This situation can cause an IRLM out-of-storage condition in the lock table and an abend.

If you need the lock structure to be stable, specify ALLOWAUTOALT(NO). If you do not specify ALLOWAUTOALT, the default value of NO is used.

**Related concepts:**

- [➞ Avoiding false contention \(DB2 Data Sharing Planning and Administration\)](#)
- [➞ Auto Alter capabilities \(DB2 Data Sharing Planning and Administration\)](#)
- [➞ Changing the size of the lock structure \(DB2 Data Sharing Planning and Administration\)](#)
- [➞ Ways to monitor DB2 locking activity \(DB2 Data Sharing Planning and Administration\)](#)

**Lock entry size parameter:**

The LOCK ENTRY SIZE parameter on installation panel DSNTIPJ determines the amount of space required for lock contention control information (that is, individual entries in the lock table).

The lock entry size and the number of lock table entries of the first IRLM to join the group determines the whole group's storage size for the lock table and the lock table entry width. The default is 2 bytes, which is probably the size you want, unless you immediately create a data sharing group of seven or more members. By restricting each lock entry to 2 bytes, you maximize the amount of RLE space available from the define structure size.

**Storage estimate for the lock structure:**

For installation planning purposes, the initial size of the lock structure is based on how much updating you do.

**Recommendation:** If you do not specify a value for the LTE parameter in the IRLMPROC procedure, choose a value for INITSIZE that is a power of 2. This enables IRLM to allocate the coupling facility storage so that half is used for lock table entries and the remainder is used for record table entries. If a 1:1 split occurs and total size is not a power of 2, you might experience a severe shortage of space for the record table entries, resulting in DB2 or IRLM failures. Those failures occur because the number of lock table entries requested during connection to the group must be a power of 2. The record table is susceptible to storage shortages if the structure is too small or if the allocation of the lock table leaves too little storage for the record table.

When you specify a value for the LTE parameter in the IRLMPROC procedure, or when you issue the MODIFY *irlmproc* SET,LTE=*nnnn* command, you should monitor XES contention rates to determine the optimum value for your normal operating environment. If the contention rates appear to be too high, increase the LTE parameter value to the next power of 2. Remember, any increase in the size of the lock table causes a corresponding decrease in the record table, unless the structure size is also increased.

If you have little contention and want more storage available for record table entries, decrease the LTE parameter value by a power of two. Anytime the number of lock table entries is decreased, you should monitor contention rates for a period of time.

Because structure allocation is done during connection, any change that is made to the LTE parameter value does not take effect unless the lock structure is reallocated. You can reallocate the lock structure in one of the following ways:

- Rebuild the lock structure. This is the simpler method.
- Terminate the group, force deallocation of the lock structure, and restart the group.

The LTE parameter value of the first IRLM to connect to the newly allocated structure dictates the coupling facility structure sizes that are used by the group.

The following table shows initial size value recommendations.

*Table 25. Recommendations for lock structure size*

INITSIZE	SIZE	Condition
32 MB	64 MB	For light sharing with a low amount of updating, or for a single-member data sharing group
64 MB	128 MB	For medium sharing with a moderate amount of update activity
128 MB	256 MB	For a high amount of sharing with a lot of update activity

### SCA size

The shared communications area (SCA) is a list structure in the coupling facility. Your storage estimate for your data sharing group should include an estimate of SCA size.

The SCA contains the following information:

- Member names
- BSDS names



- Database exception status conditions about object in the database
- Recovery information, such as log data set names and the list of indoubt XA transactions



You can use the coupling facility structure sizing tool (CFSizer) to help you calculate structure sizes. The following table shows how to estimate the size of the SCA. The SCA size can be specified in 1 KB increments.

*Table 26. Estimating storage for the SCA*

Site size	Databases	Tables	INITSIZE	SIZE
Small	50	1000	16 MB	32 MB
Medium	200	4000	32 MB	64 MB
Large	400	10,000	64 MB	128 MB
Extra Large	600	50,000	128 MB	256 MB

Running out of space in the SCA can cause DB2 to fail. Because much of the space in the SCA is taken up with exception information, you can reclaim space by correcting database exception conditions. Each indoubt XID entry takes approximately 250 bytes. The additional SCA storage required to be reserved is dependent on the total number of database access threads (DBATs) that can be active for the data sharing group. If the data sharing group supports XA transactions, be sure to reserve additional space in the SCA for the indoubt transaction ID (XID) list. (DRDA XA protocol support enables DB2 servers to participate in WebSphere coordinated two-phase commit transactions that have multiple connections to more than one data source.) After a failure, indoubt XA transactions are resolved by WebSphere, or you can reclaim space by resolving indoubt XA transactions manually.

**Related tasks:**

-  Recovering indoubt threads (DB2 Administration Guide)
-  Determine the size of each coupling facility structure (z/OS MVS Setting Up a Sysplex)

**How to change structure sizes**

You can change the size of individual structures by changing the CFRM policy.

Then you should rebuild the structures by using the z/OS command SETXCF START,REBUILD,STRNAME=*strname*. Be aware that:

- The coupling facility size does not increase unless at least one DB2 subsystem is active when this command is issued.
- This command does not work on structures that are actively being duplexed.

z/OS attempts to reallocate a new instance of the structure in the same coupling facility if that coupling facility has enough storage space. If there is not enough space, z/OS looks at the preference list and uses the specified alternate coupling facility. After the space is allocated, DB2 rebuilds the information into the new structure. Any transactions that need the structure must wait until the rebuild is complete. It is best to plan a rebuild when other activity in the system is low.

### Dynamic changes to structure sizes:


If the affected structure is allocated in a coupling facility with CFLEVEL greater than 0, you can dynamically increase the structure sizes up to a maximum limit specified on the CFRM policy by using the z/OS command SETXCF START,ALTER.

The advantages to this method are:

- DB2 can access the structures while a change is taking place.
- Less coupling facility storage is required because DB2 does not need to allocate enough space for a whole new structure. It dynamically adds or deletes storage from the existing structure.
- The command works on duplexed structures.


#### Related concepts:

Storage estimates for data sharing environments


 [Changing the size of the group buffer pool \(DB2 Data Sharing Planning and Administration\)](#)

 [Problem: storage shortage in the SCA \(DB2 Data Sharing Planning and Administration\)](#)

#### Related tasks:

 [Changing the lock structure size dynamically \(DB2 Data Sharing Planning and Administration\)](#)

#### Related reference:

 [Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

### Automatic changes to structure sizes:

z/OS can automatically alter a coupling facility structure when the structure reaches an installation-defined or default percent-full threshold, as determined by structure full monitoring.

The alter process can change the size of the structure, reapportion the objects within the structure, or both. This function works the same in data sharing environments as it does in non-data sharing environments. See [Adding MVS systems to a sysplex](#) for complete information about allowing structures to be altered automatically.

### IRLM storage size

For data sharing, plan for additional IRLM storage to accommodate data sharing-specific locks called *P-locks*.

P-locks are held on open page sets and on database descriptors (DBDs), skeleton cursor tables (SKCTs), and skeleton package tables (SKPTs). Unlike transaction locks, storage for P-locks is held even when no transaction activity exists; therefore they consume storage even with no transaction activity.

Plan also for the extra storage that IRLM needs to build retained locks in case other members fail. The following table shows the variables that you need to take into account.

Table 27. Variables that are used to estimate additional IRLM storage


Variable	Description	Calculation
X	P-locks <sup>1</sup>	$N = (\text{MAX\_OPEN\_DATA\_SETS} \times 500)$  $X = (N + (N \times .40))$
Y	Ability to hold update-retained locks for a failed member	Depends on the update intensity of the workload. Start with the following:  $Y = .25(X)(X)$


**Note:**

1. The formula is based on the assumption that more than one P-lock might be held on a page set occasionally (such as for castout activity), and an estimate of about 40% for P-locks on the EDM pool objects and for short-lived page P-locks. If you know that the EDM pool has relatively few objects in it, you can use a lower percentage for that value. Estimate the maximum number of open data sets or use the value that is specified for the subsystem parameter DSMAX.

**Related concepts:**

IRLM address space (IRLMPROC) storage requirements

 How DB2 determines the initial value of DSMAX (DB2 Performance)

 Physical locks in data sharing (DB2 Data Sharing Planning and Administration)

**Related reference:**

DSMAX field (DSMAX subsystem parameter)

**IRLM priority setting:**

If IRLM priority is too low, storage might not be freed as quickly, and IRLM might run out of storage.

The IRLM address space priority, though it should remain high, should be lower than XCFAS.


**Related tasks:**

 Determining z/OS Workload Manager velocity goals (DB2 Performance)

**IRLM storage use:**

Use the z/OS command `MODIFY irlmproc,STATUS,STOR` to see how much storage IRLM is using.

**Related reference:**

 `MODIFY irlmproc,STATUS` (z/OS IRLM) (DB2 Commands)

**Calculating storage for the coordinator and the assistants:**

Sysplex query parallelism uses IRLM notify messages to pass data between the assistants and the coordinator.

**About this task**

The coordinator uses notify messages to communicate with the assistants. The assistants use notify messages to communicate with the parallelism coordinator. An

*assisting member* is any member that receives query work from another member of the DB2 data sharing group. Before you use Sysplex query parallelism, ensure that you have enough ECSA to handle the notify messages.

### Procedure

To estimate the amount of extra storage that IRLM requires for coordinating and assisting members:

1. Estimate approximately 200 KB of extra storage for any member that can be a coordinator. This storage is needed for messages that are sent to the assistants.
2. Estimate the storage that is required for an assisting member:
  - a. Estimate the number of parallel tasks that can run concurrently on the assisting member.
  - b. Divide that number by the number of members that are sharing the query work.
  - c. Multiply the result by 32 KB.  
(numbers of queries  
× max concurrent tasks) / number of members)  
× 32 KB

### Example

Assume that you have a data sharing group in which all four members participate in processing parallel queries. If you have a total of 10 queries executing concurrently, and the highest number of parallel tasks is approximately 40, the calculation is:

$$\begin{aligned} & (10 \\ & \times 40) / 4 = 100 \\ & 100 \\ & \times 32 \text{ KB} = 3 \text{ MB of extra storage on assistant} \end{aligned}$$

## Storage estimate for the EDM pool in a data sharing environment

If you are planning to use data sharing, you should consider additional storage requirements for the EDM pool.

### General guideline

You can use the storage estimates for your capacity planning.

For data sharing, you might need to increase your storage estimate by about 10% because of the way DB2 cross-invalidates database descriptors (DBDs). This percentage is just an estimate; the actual amount of the increase depends on how often you create, drop, and alter objects in the data sharing group.

### Cross-invalidating items in the EDM pool

DB2 does not have a backup EDM pool in the coupling facility for invalidating objects in the EDM pool (DBDs, cursor tables, and more) because these objects are modified less frequently than database data. So, there is one EDM pool for each member. When a DBD changes, DB2 uses XCF messages to notify other members which are also using that DBD that new transactions should use the new DBD, which is read into the EDM pool. Thus, it is possible that one transaction is using the new DBD while other, currently running transactions are still using the old DBD. In other words, more than one copy of a DBD can exist in the EDM pool.

## Reducing the storage impact

For CREATE, ALTER, or DROP statements, the DBD is not modified until a COMMIT is issued. You can significantly reduce the number of EDM versions by issuing CREATE, ALTER, or DROP statements within a single COMMIT scope. However, the exclusive lock on the DBD is held until the COMMIT.

### Related concepts:

Default database storage requirements

### Related tasks:


Calculating EDM pool sizes

## Before you enable DB2 data sharing

You must take certain actions to prepare your environment for DB2 data sharing.

### Related concepts:

Disabling and re-enabling DB2 data sharing

 Deadlock detection and resource timeouts in data sharing environments (DB2 Data Sharing Planning and Administration)

### Related tasks:

Enabling DB2 data sharing

Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)


## Connecting CICS to DB2 (optional)

Before you enable data sharing, connect CICS to each member. The CICS attachment facility command, DSNCR STRT, lets you override the subsystem name on startup.

### About this task

To connect DB2 to CICS, you must regenerate several CICS tables with additional entries. Coordinate this connection with your CICS support group.

### Related reference:

 CICS attachment facility commands (DB2 Commands)

## Connecting DB2 to IMS (optional)

Before you enable data sharing, attach IMS to every member that runs IMS applications. IMS must include a separate member SSM for every member DB2.

### About this task

Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. Make DB2 load modules available to IMS.
2. Define DB2 to IMS.
3. Define new programs and transactions to IMS.
4. Prepare IMS applications for DB2.
5. Depending on your site, you might also need to:

- Define DB2 plans for IMS applications.
- Generate a user language interface.

## Registering the command prefixes, member group attachment name, and subgroup attachment name

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

### Before you begin

To specify subgroup attachment names, you must use DB2 10 early code.

### Procedure

To register the command prefixes, member group attachment name, and subgroup attachment name:

Use parameter library member IEFSSNxx. For example:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
      INITPARM('DSN3EPX,<cmd-prefix>,<scope>,<group-attach>,<subgroup-attach>>>')
```

By default, the subsystem definition does not include the subgroup attachment name. If you specify a value for SUBGRP NAME on installation panel DSNTIPK, the installation CLIST appends the name to the subsystem definition.

**Recommendation:** When you register the 1- to 8-character command prefix in parameter library member IEFSSNxx and specify the scope of the prefix, choose a scope of started (S). This specification lets all z/OS systems in a single PARMLIB member IEFSSNxx use all z/OS systems in the Parallel Sysplex. It also simplifies the task of moving a member from one system to another; you can stop DB2 on one z/OS system and start it on another. You do not need to re-IPL the system.

### Results

The following sample definitions are examples of what might appear in the shared parameter library SYS1.PARMLIB:

```
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB0A'
DB2A,DSN3INI,'DSN3EPX,-DB2A,S,DB0A,SBG1'
DB3A,DSN3INI,'DSN3EPX,-DB3A,S,DB0A,SBG1'
DB4A,DSN3INI,'DSN3EPX,-DB4A,S,DB0A,SBG2'
```

### What to do next

If you need to change the command prefix parameters, you must change entry IEFSSNxx and re-IPL the host system. For example, if you want to change the command prefix scope from system-wide to Parallel Sysplex-wide, and you want to register the prefix at DB2 startup, change the M in the entry to S before you re-IPL.

If you want to use multiple-character command prefixes, make sure that your automation programs can handle multiple-character prefixes in messages before you change the prefixes.

#### Related concepts:

Group attachment names and subgroup attachment names

#### Related tasks:

Migration step 13: Define DB2 10 to z/OS: DSNTIJMV

## Increasing the size of the BSDS

Data sharing causes additional records to be written to the BSDS for member information.

### About this task

**Recommendations:** To prevent the BSDS from expanding into secondary extents, change the size of the primary space allocation to 1500 records. This change is necessary only for members that have followed the recommended migration path from a previous DB2 version without altering that record size. New installations and member installations already do this for you.

### Procedure

To increase the space allocation for the BSDS:

1. Rename existing BSDSs.
2. Define larger BSDSs with the original names.
3. Copy the renamed BSDSs into the new BSDSs.

### Results

You can do this using access method services. To see the definition that is used for the BSDSs, see the installation job DSNTIJIN.

## Increasing the size of the SYSLGRNX table space

The SYSLGRNX directory table space contains the relative byte address (RBA) ranges showing when data sets are open for updating.

### About this task

Because more members open and close data sets in a data sharing configuration, this table space is likely to grow with the addition of each new member to the data sharing group. And if you choose to copy indexes, this table space can grow even more.

Consider increasing the frequency with which you remove rows from this table space, or increasing the size. To see the definition used for SYSLGRNX, see installation job DSNTIJIN.

### Procedure

To increase the space allocation for SYSLGRNX, use access method services:

1. Stop the table space.
2. Rename the existing SYSLGRNX data set.
3. Define a larger SYSLGRNX data set with the original name.
4. Using only DSN1COPY, copy the contents of the renamed data set into the new SYSLGRNX data set.
5. Restart the table space.

### Database design recommendation

You should partition table spaces as much as possible and use as much separation of I/O as possible.

*Define table spaces and indexes with GBPCACHE CHANGED:* It is unlikely that members that are processing a large query will repeatedly read the same pages, so those pages do not need to be cached in the group buffer pool. Define the relevant table spaces and indexes with GBPCACHE CHANGED (the default).

**Related tasks:**

 Partitioning for optimal parallel performance (DB2 Performance)

## Application design planning for data sharing

Particular considerations apply to applications for use in DB2 data sharing environments.

### CACHE option of CREATE SEQUENCE statement

The CACHE option of the CREATE SEQUENCE statement is a performance and tuning option that directs DB2 to preallocate a specified number of sequential values in memory.

#### GUPI

Sequence objects provide unique, sequential, and numeric values to DB2 applications. Applications can use sequence numbers for a variety of purposes, including the avoidance of concurrency and performance problems that can result when applications generate their own sequence numbers. Unlike application-generated sequences, DB2 sequence objects allow multiple transactions to concurrently increment the sequence number, and DB2 guarantees that each sequential value is unique. DB2 does not wait for a transaction that has incremented a sequence to commit before allowing the sequence to be incremented by another transaction. No retained locks are held to prevent access to the sequence.

Every time a cache is allocated, the SYSIBM.SYSSEQUENCES table is updated and a forced log record is written for the update. Using ORDER or NO CACHE will result in a SYSIBM.SYSSEQUENCES table update and the associated forced log write every time a new value is generated by DB2. Specifying CACHE provides faster access to the sequence since values are assigned from the cache. It also reduces the number of SYSIBM.SYSSEQUENCES updates and the associated forced log records. The SYSIBM.SYSSEQ table space is defined with the MAXROWS(1) attribute in order to minimize page P-lock contention in a data sharing environment as the SYSIBM.SYSSEQUENCES table gets updated.

DB2 always generates sequence numbers in order of request. However, when a sequence is shared across multiple members of a data sharing group, each DB2 member allocates its own cache of unique consecutive numbers for the sequence. Therefore, in situations where transactions from different members are requesting the next sequence number from the same sequence, values assigned for the sequence across multiple DB2 members may not be in strict numeric order.

**Example:** Assume that members DB2A and DB2B share a sequence named SEQ1 that starts with 1, increments by 1, and has cache = 20. If the transaction that is associated with DB2A makes the first request for a sequence number, DB2A allocates a cache of 20 values (from 1 to 20) and the value of 1 is provided to the application. If the transaction that is associated with DB2B makes the next request for a sequence number, DB2B allocates its own cache of 20 values (from 21 to 40) and the value of 21 is provided to the application. Assuming that sequence number requests continue to arrive from the transactions that are associated with members



DB2A and DB2B in this manner (one from DB2A and then one from DB2B), the values assigned for that sequence are 1, 21, 2, 22, 3, 23, and so on. Although the numbers are in sequence within each DB2, the numbers assigned across multiple DB2 members are not in strict numeric sequence.

In a data sharing environment, using the ORDER or NO CACHE option ensures that the values assigned to a sequence which is shared by applications across multiple DB2 members are in strict numeric order. In a data sharing environment, if ORDER is specified, then NO CACHE is implicit even if CACHE n is specified.

In a non-data sharing environment, the numbers are always assigned in strict numerical order, even if NO ORDER is specified; so specifying ORDER or NO CACHE is not necessary.

**Important:** Specifying ORDER or NO CACHE in a data sharing environment, or NO CACHE in a non-data sharing environment, is not recommended because it will result in a SYSIBM.SYSSEQUENCES table update and the associated forced log record for each value generated by DB2. This can lead to an excessive amount of log write I/Os, which can drastically reduce the log write bandwidth.

#### ◀ GUPI

**Related reference:**

➡ CREATE SEQUENCE (DB2 SQL)

## Applications using CICSplex System Manager

CICSplex<sup>®</sup> System Manager (CICSplex SM) is a system-management tool that lets you manage several Customer Information Control System (CICS) systems as if they were one.

The dynamic transaction routing program that is supplied with CICSplex SM balances the enterprise workload dynamically across the available application owning regions. CICSplex SM lets you manage a variable workload without operator intervention and maintains consistent response times. It can do this because it routes transactions away from busy regions and from those that are failing or likely to fail, which improves throughput and conceals problems from users.

### Storm-drain effect:

In some situations, your DB2 applications must be sensitive to a resource-unavailable condition.

For example, assume that a database is stopped for planned maintenance, and that the application receives SQLCODE -904 from the system and ends normally. If your application ignores the SQLCODE -904 message, CICSplex SM might continue to route work to the stopped system because it appears to complete its work rapidly. This is sometimes called the *storm-drain* effect.

When both of the following conditions are true, the storm drain effect can occur:

- The CICS attachment facility is down.
- You are using INQUIRE EXITPROGRAM to avoid AEY9 abends.

Again, because there has not been an abend, it appears as if work completes rapidly at that subsystem.

## How a CICS exit routine can avoid the storm-drain effect:

You can write a resource manager interface program exit routine, XRMIOUT, to avoid the storm drain effect caused by SQLCODE -904 (resource unavailable). This exit routine does not avoid the storm-drain problem caused by using INQUIRE EXITPROGRAM to avoid AEY9 abends.

### About this task

#### GUPI

Using XRMIOUT, you can intercept the return from the resource manager. The exit routine can determine whether:

- The resource manager is DB2.
- SQLCODE -904 is in the SQL communication area (SQLCA).

If these conditions exist, abend the transaction instead of ending the transaction normally.

To determine if DB2 is the resource manager, compare 'DSNCSQL' with the value stored at the address that is included with the UEPTRUEN parameter that is passed to XRMIOUT, as shown in the following figure.

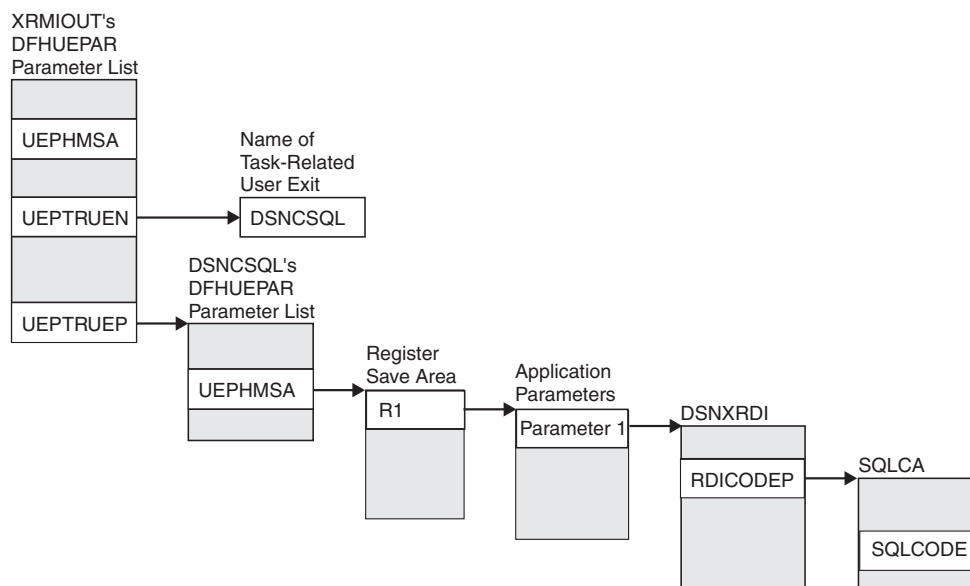


Figure 5. Pointers to resource manager name and SQLCODE

### Procedure

To find the SQLCODE:

1. Find UEPTRUEN in the DFHUEPAR parameter list that is passed to XRMIOUT. UEPTRUEN contains the address of the DFHUEPAR parameter list that is passed to DSNCSQL.
2. Find UEPHMSA in DSNCSQL's DFHUEPAR parameter list. UEPHMSA points to the register save area that contains the application's registers.
3. Find register 1 in the register save area. Register 1 contains the address of the application parameters.

The DSNXRDI macro maps the application parameters that are passed by the precompiler to DB2. The mapping macro is contained in the data set library prefix.SDSNMACS.

4. Find RDICODEP in the DSNXRDI structure. RDICODEP contains the address of the SQL communication area (SQLCA).
5. Find the SQLCODE.

#### GUPI

#### Related concepts:

➞ SQL control statements for external SQL procedures (DB2 SQL)

#### Related reference:

➞ Exit XRMIOUT (CICS Transaction Server for z/OS)

#### A CICS enhancement that avoids the storm-drain effect:

The CICS Transaction Server for z/OS helps you avoid the storm-drain effect. With the CICS Transaction Server for z/OS, you do not need to use XRMIOUT to check for resource unavailable conditions.

CICS Transaction Server for z/OS also lets you benefit from the INQUIRE EXITPROGRAM command without causing the storm-drain effect.

#### Related information:

➞ INQUIRE EXITPROGRAM (CICS Transaction Server for z/OS)

### Order-dependent transactions

In limited cases, one transaction, called an originating transaction, updates DB2 data with INSERT, UPDATE, or DELETE. Before completing phase 1 of the commit process, the originating transaction spawns a second transaction that is dependent on the updates of the first transaction. These types of transactions are referred to as *order-dependent transactions*.

### Description of the problem

In some situations, a dependent transaction can encounter a “row not found” condition that does not occur in non-data sharing environments. Even in non-data sharing environments, dependent transactions need to tolerate the “row not found” condition in cases where the originating transactions roll back.

### When the problem might occur

The “row not found” condition can occur if all of the following conditions are true:

- The originating transaction spawns a dependent transaction before it completes phase 1 of the commit process.
- The dependent transaction runs on a different member than the member on which the originating transaction runs.

Because each member has its own local buffer pools, the uncommitted buffered pages that are updated by the originating transaction are not immediately visible to the dependent transaction.

- The dependent transaction attempts to access a row that was updated by the originating transaction.
- The dependent transaction is not bound with an isolation level of repeatable read.

## Preventing the problem

To prevent these periodic “row not found” situations, consider using the IMMEDIATEWRITE(YES) option of the BIND and REBIND commands for plans or packages that spawn dependent transactions that might run on other members. You can also use the IMMEDIATEWRI subsystem parameter. IMMEDIATEWRITE(YES) means that DB2 writes the page as soon as the buffer update completes. DB2 writes the data to one of the following structures or devices:

- The group buffer pool
- Disk storage for GBPCACHE NO group buffer pools
- Disk storage for GBPCACHE NONE page sets
- Disk storage for GBPCACHE SYSTEM page sets

The IMMEDIATEWRI parameter (IMMEDIATE WRITE field on installation panel DSN TIP8) can override the value of the IMMEDIATEWRITE bind option on a data sharing member. The following table illustrates the implied hierarchy when using the IMMEDIATEWRI subsystem parameter and the IMMEDIATEWRITE option of the BIND and REBIND commands.

Table 28. The implied hierarchy of the immediate write option

IMMEDIATEWRITE bind option	IMMEDIATEWRI subsystem parameter	Value at run time
NO	NO	NO
NO	YES	YES
YES	NO	YES
YES	YES	YES

**Note:** YES always has precedence whether it is defined by the subsystem parameter or the bind option. Updated pages that are group buffer pool-dependent are written at, or before, phase 1 of the commit process.

The following alternatives can help solve the order-dependent transaction problem:

- Ensure that the originating transaction does not schedule the dependent transaction until the originating transaction has completed phase 1 of commit.
- Run the dependent transaction with an isolation level of repeatable read.
- If the dependent transaction is currently running with an isolation level of cursor stability AND CURRENTDATA(NO), changing it to use CURRENTDATA(YES) can sometimes solve the problem.
- Add statement retry logic to handle the return of a “row not found” condition.
- Run the dependent transaction on the same member as the originating transaction.

### Related concepts:

The scope and uniqueness of DB2 subsystem parameters in data sharing

## Binds of plans and packages that move to a new machine

You do not need to rebind a plan or package to run it on a data sharing group.

However, if you are moving to a new machine that has different performance characteristics (moving from a System/390<sup>®</sup> microprocessor to a z/Series microprocessor cluster, for example), it is to your advantage to rebind plans and packages on the machine on which they will be running.

### Related concepts:

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## Preparing for DB2 10 migration in DB2 data sharing

When planning the migration of data sharing members to DB2 10 it is best to take certain actions to reduce or avoid unnecessary operation complexity.

### Procedure

To prepare for migration to DB2 10 in data sharing, use the following approaches:

- Before you migrate to DB2 10, read the information about release incompatibilities and make any necessary changes. For more information, see *Changes to DB2 that might impact your migration to DB2 10 conversion mode (DB2 for z/OS What's New?)*.
- Plan to minimize the amount of time that members on DB2 9 and members on DB2 10 operate in release coexistence. For more information about the operational complexity that release coexistence introduces in DB2 data sharing , see *Mixed releases in a DB2 data sharing group*.
- Before you migrate to DB2 10 conversion mode (from Version 8 or Version 9), ensure that maintenance through the DB2 10 fallback SPE is applied to all started DB2 members. If the fallback SPE is not on all active group members, DB2 10 does not start but issues a message. If you have quiesced members in your data sharing group, you do not need to apply the fallback SPE to the quiesced member.
- Start only one DB2 member for migration processing. During the migration, other group members can be active. However, other active group members may experience delays or timeouts if they attempt to access catalog objects that are locked by migration or enabling-new-function mode (from Version 8 or Version 9) processing. After migration completes on the first member, you can migrate the other data sharing group members.
- To prepare for possible fallback from DB2 10 conversion mode (from Version 8 or Version 9), keep the subsystem parameter load module that is used by the version that you are migrating from.
- After all members have migrated to DB2 10 conversion mode (from Version 8 or Version 9), remain in that mode until your data sharing group has processed a full range of typical work. The amount of time that a data sharing group needs to remain in DB2 10 conversion mode (from Version 8 or Version 9) depends on the size of the data sharing group and the complexity of its typical work.

### Related concepts:

Planning for DB2 data sharing

Release coexistence in a data sharing environment

Changes that might affect your migration from Version 8

Changes that might affect your migration from DB2 9

### Related tasks:

Installing, migrating, and enabling DB2 data sharing

Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)

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## Release coexistence considerations

Version 8 or DB2 9 can coexist with DB2 10 in a data sharing environment and in a distributed environment.

In a data sharing or distributed environment, coexistence is limited to two releases at a time. A DB2 10 member can coexist with other DB2 10 members and Version 8 members, or with other DB2 10 members and DB2 9 members.

### Release coexistence in a distributed environment

DB2 10 communicates in a distributed data environment with Version 8 and DB2 9 by using DRDA access.

You can exchange data of newer types with other database systems by using the appropriate level of DRDA. The newer data types and the level of DRDA that they require are as follows:

#### **BIGINT**

The minimum SQL Application Manager (SQLAM) level is 6. DRDA specifies that DECIMAL(19,0) is to be used as the compatible data type to which a sender converts BIGINT data before transmission to a DRDA partner at a lower level. DB2 Version 7 and DB2 Version 8 convert BIGINT as follows:

- Accept BIGINT input from a DRDA requester by converting the input from BIGINT to DECIMAL(19,0).
- Accept BIGINT output from a DRDA server by converting the output from BIGINT to DECIMAL(19,0).

DB2 can process BIGINT directly and does not convert BIGINT to decimal before processing it.

#### **BINARY and VARBINARY**

The minimum SQL Application Manager (SQLAM) level is 8. DRDA defines a compatible mapping for use with DRDA partners at a lower SQLAM level for output data only. The compatible mapping for BINARY is CHAR FOR BIT DATA and the compatible mapping for VARBINARY is VARCHAR FOR BIT DATA.

DB2 issues SQLCODE -352 for BINARY and VARBINARY data to be input to servers at lower SQLAM levels.

DB2 downgrades BINARY and VARBINARY outputs to CHAR FOR BIT DATA and VARCHAR FOR BIT DATA types if the statement being executed is dynamic. Otherwise, DB2 issues SQLCODE -351 for BINARY and VARBINARY data to be output to a down-level requester if the statement is static.

This behavior supports middleware products that perform SELECT \* against servers at higher SQLAM levels. It is expected that these dynamic applications will issue DESCRIBE to understand the type and size of the output data and will set up appropriate application data types to receive the output data. By choosing the correct type and size, the applications avoid padding problems.

#### **TIMESTAMP WITH TIME ZONE**

The minimum SQL Application Manager (SQLAM) level is 9.

DB2 issues SQLCODE -352 when servers at lower SQLAM levels (level 8 or below) request TIMESTAMP WITH TIME ZONE data as input.

If the precision of `TIMESTAMP WITH TIME ZONE` output data is greater or less than 6, DB2 sends the data to requesters at lower SQLAM levels after converting the data to `TIMESTAMP`. If the precision is greater than 6, the data is truncated to `TIMESTAMP(6)`. If the precision of the output data is less than 6, the `TIMESTAMP` data is padded with zeros.

This behavior supports middleware products that perform `SELECT *` against servers at higher SQLAM levels. It is expected that these dynamic applications will issue `DESCRIBE` to understand the type and size of the output data and will set up appropriate application data types to receive the output data. By choosing the correct type and size, the applications avoid padding problems.

## Release coexistence in a data sharing environment

Coexistence considerations are similar to those that you need to understand for the fallback environment. For example, objects that are frozen in fallback are generally not accessible from a down-level member (either Version 8 or DB2 9) that is still running under a prior DB2 release.

**Important:** Apply the fallback SPE and stop and restart DB2 9 for every subsystem or data sharing member that you plan to migrate to DB2 10. For data sharing, every member must be started in DB2 9 after the fallback SPE is applied. After migration to DB2 10 new-function mode, any active members that did not start in DB2 9 with the fallback SPE applied prevent DB2 10 from starting. Inactive members that never started with the fallback SPE applied in DB2 9 cannot start in DB2 10 or DB2 9 after migration to DB2 10 completes on any other member.

In a data sharing group, DB2 can support members in Version 8 and members in DB2 10 conversion mode from Version 8. Or, DB2 can support members in DB2 9 and members in DB2 10 conversion mode from Version 9. To support two releases, you must first apply the fallback SPE to all Version 8 or DB2 9 members of the group. Release coexistence begins when you migrate the first data sharing member to DB2 10. You must successfully migrate the first data sharing member to DB2 10 before attempting to migrate the other data sharing members.

For the best availability, you can migrate the members to DB2 10 one member at a time. When developing your migration plan, remember that most new functions that are introduced in DB2 10 are not available to any members of the group until all members are migrated to DB2 10 new-function mode.

### DB2 10 migration modes

The DB2 10 migration process is designed to be accomplished in phases.

- Migrating a member to DB2 10 initially puts that member into conversion mode (from Version 8 or Version 9). In this mode, no new DB2 10 function is available for use.
- To make new function available, you must put the group through the enabling new-function mode process. Before attempting this process, confirm that all members are running DB2 10. The enabling new-function mode process can only begin if all members are running DB2 10.
- When the enabling new-function mode process completes successfully, the group enters DB2 10 new-function mode, in which all new DB2 10 function is available for use.

From either DB2 10 enabling-new-function mode (from Version 8 or Version 9) or from DB2 10 new-function mode, members cannot return to DB2 10 conversion mode (from Version 8 or Version 9), nor fall back to the previous release. The only way to recover to a previous catalog level is to perform a point-in-time recovery of both the catalog and directory.

## TSO, CAF, and RRSF logon procedures

You can attach to either release of DB2 with your existing TSO, CAF, or RRSF logon procedures without changing the load libraries for your applications. After you migrate completely to the latest level of DB2, you must update those procedures and jobs to point to the latest level of DB2 load libraries. If you forget to update those procedures and jobs before migrating to any release subsequent to DB2 10, those procedures and jobs can no longer work in that subsequent release.

## Private protocol

Other pre-DB2 10 subsystems or data sharing groups can continue using private protocol to access information that is managed by a data sharing group if there is at least one Version 8 or DB2 9 member of the group. If a package or plan is bound with DBPROTOCOL(PRIVATE), it can be processed successfully by a Version 8 or DB2 9 member of the group. If a DB2 10 member of the data sharing group attempts to run a package or plan that is bound with DBPROTOCOL(PRIVATE) and accesses a remote location, the application fails with SQLCODE -904. If a package or plan is manually rebound on a DB2 10 member, it can only be rebound with the DBPROTOCOL(DRDA) bind option. If the rebound package or plan is then subsequently used on a Version 8 or DB2 9 member, the object will be automatically rebound and it will retain the DBPROTOCOL(DRDA) setting.

After all members are migrated to DB2 10 conversion mode (from Version 8 or Version 9), the group can no longer use private protocol objects or accept private protocol requests from other data sharing groups or subsystems.

## Access paths of dynamic SQL queries

DB2 10 can capture access paths of dynamic SQL queries in new catalog tables. However, in data sharing environments, Version 8 and DB2 9 members are not able to use the stabilized access paths.

## Database metadata stored procedures

In DB2 10, the database metadata stored procedures have new Unicode load modules.

*Table 29. Database metadata stored procedures and corresponding Unicode load modules*

Stored procedure name	Unicode load module
SYSIBM.SQLCOLPRIVILEGES	DSNACPRU
SYSIBM.SQLCOLUMNS	DSNACOLU
SYSIBM.SQLFOREIGNKEYS	DSNAFNKU
SYSIBM.SQLFUNCTIONCOLS	DSNAFCOU
SYSIBM.SQLFUNCTIONS	DSNAFUNU
SYSIBM.SQLGETTYPEINFO	DSNATYPU
SYSIBM.SQLPRIMARYKEYS	DSNAPRKU



Table 29. Database metadata stored procedures and corresponding Unicode load modules (continued)

Stored procedure name	Unicode load module
SYSIBM.SQLPROCEDURECOLS	DSNAPCOU
SYSIBM.SQLPROCEDURES	DSNAPRCU
SYSIBM.SQLSPECIALCOLUMNS	DSNASPCU
SYSIBM.SQLSTATISTICS	DSNASTAU
SYSIBM.SQLTABLEPRIVILEGES	DSNATBPU
SYSIBM.SQLTABLES	DSNATBLU
SYSIBM.SQULUDTS	DSNAUDTU
DSNACLRLU DLL (for remote procedure)	DSNACLRLU

If you use the DB2 database metadata stored procedures in a coexistence environment, you need to make the DB2 10 load modules that are listed above available to your Version 8 or DB2 9 members.

To make your DB2 10 load modules available to your Version 8 or DB2 9 members, complete one of the following tasks:

- Copy the DB2 10 load modules that are listed above into the Version 8 or DB2 9 *prefix.SDSNLOAD* libraries.
- Include the DB2 10 *prefix.SDSNLOAD* library in the STEPLIB of the WLM startup procedure for the database metadata stored procedures.

## REORG SHRLEVEL REFERENCE

From V8

Version 8 does not support REORG SHRLEVEL REFERENCE for LOB table spaces. To use REORG SHRLEVEL REFERENCE for LOB table spaces in a coexistence environment with Version 8 members, direct utility jobs to the DB2 10 member of the data sharing group.

From V8

## REORG TABLESPACE SHRLEVEL CHANGE PART x job

From V8

If you submit a REORG TABLESPACE SHRLEVEL CHANGE (or REFERENCE) PART x job on a Version 8 member, you might get an error message if a REORG TABLESPACE SHRLEVEL CHANGE (or REFERENCE) PART y job is running on another partition of the same table space that is on a DB2 10 member.

From V8

**Related concepts:**

From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

**Related tasks:**

Preparing for DB2 10 migration in DB2 data sharing

**Related reference:**

 REORG TABLESPACE (DB2 Utilities)

## **IRLM service and release coexistence**

As you apply IRLM service to members of a data sharing group, some members run with the newer service level, and some run with the older service level.

A mix of service levels can raise issues that you must consider.

| When the IRLM subsystems in the group are at different service levels, the group  
| function level for IRLM is the lowest IRLM function level. All IRLM subsystems in  
| the group are functional, but any enhancements or fixes that were made at the  
| higher function levels are not available.

**Related tasks:**

Determining the function level of an IRLM group in coexistence

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## Chapter 3. Loading the DB2 libraries

IBM distributes DB2 on tapes or cartridges, depending on which feature you order. To load the DB2 libraries, use System Modification Program Extended (SMP/E). SMP/E processes the installation tapes or cartridges and creates DB2 distribution libraries, DB2 target libraries, and SMP/E control data sets.

For information on using SMP/E, see DB2 Program Directory.

### Related tasks:

Tailoring DB2 jobs to your environment using the installation CLIST

#### From V8

Premigration checklist for migration to DB2 10 conversion mode from DB2 Version 8

#### From V8

#### From V9.1

Premigration checklist for migration to DB2 10 conversion mode from DB2 9

#### From V9.1

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## Editing the SMP/E jobs

Before running any of the SMP/E jobs, you must edit them. Some of the items that you might want to edit include link list options and naming conventions for the DB2 library data sets.

## Creating JOB statements

The SMP/E jobs do not include JOB statements. Although JOB statements are often built automatically, creating your own JOB statements that are correct for your site is usually easier than editing the provided JOB statements.

### Procedure

To create JOB statements:

1. If you are using ISPF to edit and submit the SMP/E jobs, edit a member that contains the JOB statement. Delete all text except the JOB statement. Then use the ISPF COPY command to copy the member into each job before submitting it.
2. If you are using TSO to submit the SMP/E jobs, edit a JOB statement and submit that JOB statement with each job. For example, data set JCL.CNTL(J) might contain the following code:

```
//DB2INST JOB ACCT,NAME,  
//          MSGCLASS=A,MSGLEVEL=(1,1),  
//          TIME=(10),USER=SYSADM,PASSWORD=xxxxxxxxx  
/*JOBPARM  ....  
/*ROUTE   PRINT  ....
```

When you are ready to submit a job, use a command like the following command:

```
SUBMIT (JCL(J) JCL(DSNxxxxx))
```

In this command, *xxxxx* represents the last five characters of the SMP/E job name. This command submits the JOB statement along with the job.

## Choosing link list options

Before you run the SMP/E jobs to load the DB2 libraries, you can choose your link list options.

### Procedure

To choose your link list options:

Consider and choose your link list options based on the following information about the load module libraries:

#### *prefix*.SDSNLINK

Contains DB2 modules that are referred to as early (ERLY) code, which must reside in an APF-authorized library. You must place early code modules in the link list because they are loaded at subsystem initialization during IPL. In the link list, you can have only one level of the early code. That early code can be shared by multiple subsystems and releases of DB2. Therefore, you must choose the level of early code that is appropriate for all subsystems that use the link list. Version 8 early code with the required maintenance is upward compatible with DB2 10. DB2 9 early code is downward compatible with Version 8 and upward compatible with DB2 10. The DB2 10 early code is downward compatible with Version 8 and DB2 9. The DB2 10 early code is incompatible with DB2 Version 7.

If you are migrating, maintenance to early code or an installation of new early code requires that you activate the early code, which can be done in a couple of ways:

- Activate the early code by doing an IPL of z/OS. An IPL is required if Version 8 early code is in use for that subsystem.
- Another option to activate maintenance to early code is to issue the REFRESH DB2,EARLY command. If you use this command, the subsystem that is having its early code refreshed must be stopped when the command is issued.

To initialize a new DB2 subsystem, you can issue the z/OS SETSSI command, which will execute the early code initialization routine and update the subsystem vector table (SSVT).

You should schedule a z/OS IPL before or during a migration to a new release of DB2. This IPL is necessary because migration job DSNTIIMV makes changes to SYS1.PARMLIB that are not recognized by z/OS until the next IPL. Alternatively, you can use the SETSSI, SETPROG APF, and SETPROG LNKLST commands to define the subsystem to z/OS until the next IPL. Changes that DSNTIIMV makes to the SYS1.PARMLIB might affect the following libraries:

- New subsystem definitions in IEFSSNxx
- New APF libraries in IEAAPFxx
- New load module libraries in LNKLSTxx

#### *prefix*.SDSNLOAD

- Is a main load module repository
- Can be shared by multiple subsystems at the same release level
- Allows only DB2 to modify code
- Holds default exit routines
- Is APF-authorized
- Must be a PDSE

*prefix*.SDSNLOD2

Contains a PDSE data set, which contains JDBC and SQLJ DLLs. Although DB2 does not require that SDSNLOD2 be APF-authorized, be aware that if this data set is in a STEPLIB data set concatenation of an address space that does need APF authorization, SDSNLOD2 must also be APF-authorized.

*prefix*.SDSNEXIT

- Holds the subsystem parameter module, DSNHDECP, and user-written exit routines
- Is modified by user
- Is APF-authorized

**Link list recommendation for IRLM**

Adding the IRLM load module DXRRL183 to the link list is highly recommended so that IBM Software Support can assist in diagnosing and resolving potential problems. Although IRLM can operate without this load module, if the DXRRL183 load module is not in the link list, users cannot run CT TRACE commands to externally start and stop IRLM component traces, which are critical in diagnosing problems. (Although IRLM 2.3 is required in DB2 10, you can use the DXRRL183 load module from IRLM 2.2.) To add DXRRL183 to the link list if it is not already there, you need to copy the module into a link-listed library. After you apply maintenance to IRLM that affects DXRRL183, remember to copy the updated module to the link list.

**Integrated Cryptographic Services Facility link list requirement**

If you plan to use encryption with your DB2 subsystem, you must include in the link list the Integrated Cryptographic Services Facility library that contains the SCSFMOD0 load module. The SQL statement SET ENCRYPTION PASSWORD and the following built-in functions require this support:

- ENCRYPT
- DECRYPT\_BIT
- DECRYPT\_DB
- DECRYPT\_CHAR
- GETHINT

**Supporting one DB2 subsystem**

You can choose among several methods of maintaining a single DB2 subsystem. The following steps describe what is probably the easiest method for most sites:

1. Change the SMP/E procedure DSNALLOC to assign all load modules to *prefix*.SDSNLOAD. You can do this by changing the data set name for DDDEF (SDSNLINK) from *prefix*.SDSNLINK to *prefix*.SDSNLOAD.
2. Remove the allocation for *prefix*.SDSNLINK from the allocation job DSNALLOC.

3. Include *prefix.SDSNLOAD* (instead of *prefix.SDSNLINK*) in the LNKLSTxx member of SYS1.PARMLIB.

### Supporting multiple DB2 subsystems

Supporting multiple subsystems can mean several things. You can have two or more DB2 subsystems at the same release and service level (for example, two DB2 10 subsystems). Create separate libraries for DSNHDECP and user-written exit routines of each DB2 subsystem.

You can also have two or more DB2 subsystems at the same release level, but at different service levels. For example, you can have a DB2 10 production subsystem and a DB2 10 test subsystem at different service levels. Alternately, you can have two DB2 subsystems at different release levels. For example, you can have a DB2 10 subsystem and a DB2 9 subsystem.

In either of these cases, you can use an INCLUDE statement in JCL or a started task to identify the necessary load modules.

The DB2 subsystem must use the appropriate release level of *prefix.SDSNLOAD*, but the application attachment code (for example, CICS, CAF, or TSO attachment facilities) can use code that is either one release level down or one release level up from that of *prefix.SDSNLOAD*. To use application attachment code that is either one level down or one level up from that of *prefix.SDSNLOAD*, place the attachment code in a different STEPLIB data set from the STEPLIB data set that DB2 executes.

#### Related tasks:

Preparing for DB2 10 migration in DB2 data sharing  
Migration step 13: Define DB2 10 to z/OS: DSNTIJMV

#### Related reference:

➡ -REFRESH DB2,EARLY (DB2) (DB2 Commands)

➡ z/OS SETSSI Command (MVS System Commands)

➡ z/OS SETPROG Command (MVS System Commands)

## Accessing the correct DB2 program library

If you do not place *prefix.SDSNLOAD* in the LNKLSTxx member of SYS1.PARMLIB, you must provide JOBLIB or STEPLIB statements for it in certain types of programs and procedures.

### About this task

The installation and migration jobs that are provided with DB2 10 already contain the necessary JOBLIB or STEPLIB statements. In addition, the startup procedures that DB2 provides include STEPLIB statements for their respective program libraries, *prefix.SDSNLOAD*, and *prefix.SDSNEXIT*.

### Procedure

To access the correct program library:

Provide STEPLIB or JOBLIB statements for the following types of programs and procedures if you do not place *prefix.SDSNLOAD* in the LNKLSTxx member of SYS1.PARMLIB.

- **TSO or batch jobs** that access DB2 services require JOBLIB or STEPLIB statements for *prefix.SDSNLOAD*. These jobs include TSO logon procedures and batch jobs that access the DSN command and subcommands, the DB2 precompiler, and DB2 utilities.
- **IMS control, message, and batch processing jobs** also require JOBLIB or STEPLIB statements for *prefix.SDSNLOAD*. You must specify the DB2 load library in the startup procedure for each IMS region (IMS control, message processing program (MPP), batch message processing (BMP), and Fast Path region) that can communicate with DB2. You can do this in two ways:
  - If all the data sets that the JOBLIB or STEPLIB statement refers to for an IMS region are APF-authorized, add the DD statement for *prefix.SDSNLOAD* to the JOBLIB or STEPLIB statement. If you are using the DYNAM option of COBOL, the IMS RESLIB DD statement must precede the reference to *prefix.SDSNLOAD* in the JOBLIB or STEPLIB statement.
  - If any of the data sets that the JOBLIB or STEPLIB statement refers to for the IMS region are not APF-authorized, add the DFSESL DD statement for *prefix.SDSNLOAD*. All libraries that are specified on the DFSESL DD statement must be APF-authorized. The DFSESL DD statement is not required by the DB2 DL/I batch support. IMS requires that an IMS RESLIB DD statement also be referred to by the DFSESL DD statement, as in the following example:
 

```
//DFSESL    DD    DSN=ims_reslib,DISP=SHR
//          DD    DSN=prefix.SDSNLOAD,DISP=SHR
```
- **CICS procedures**, including the CICS initialization JCL, also need to include DB2 libraries.

**Related tasks:**

 CICS startup JCL requirements for connection to DB2

## Performance implications of installation libraries

The performance of your system might be degraded by including modules in the libraries that are included in the link list and you might want to consider the strategies below. These general suggestions might not match the specific needs of your site.

Adding many modules to the libraries that are included in the link list can reduce system performance. However, adding only a few modules to the libraries requires additional STEPLIB or JOBLIB statements. Because these STEPLIB or JOBLIB statements must be searched before the link list is searched, this approach can also reduce system performance. The approach that produces the best performance for your site depends on the environment in which you use DB2. Regardless of which attachment facilities you use, the modules in *prefix.SDSNLINK* must always be in the link library list.

If you run multiple DB2 subsystems on the same LPAR, but the DB2 subsystems are at different release and service levels, you need to include *prefix.SDSNLINK*, but not *prefix.SDSNLOAD*, in the LNKSTxx member of SYS1.PARMLIB. Place the needed STEPLIB or JOBLIB statements in the JCL procedures and batch jobs.

If you are using DB2 with IMS, you need to include *prefix.SDSNLINK*, not *prefix.SDSNLOAD*, in the LNKSTxx member of SYS1.PARMLIB because both the IMS RESLIB and *prefix.SDSNLOAD* have the DSNHLI alias. Place the needed STEPLIB or JOBLIB statements in the IMS procedures.

If you are using DB2 with IMS and you want *prefix.SDSNLOAD* (in addition to *prefix.SDSNLINK*) in the LNKLSTxx member of SYS1.PARMLIB, ensure that the library concatenation for *prefix.SDSNLOAD* and the IMS RESLIB are correct for your site because both libraries have the DSNHLI alias.

If you are using DB2 with CICS, you should probably put *prefix.SDSNLINK*, not *prefix.SDSNLOAD*, in the LNKLSTxx member of SYS1.PARMLIB. Then, place the needed STEPLIB or JOBLIB statements in the CICS procedures.

If you use the TSO attachment facility, RRS attachment facility, and call attachment facility, you might need to handle placement of load modules somewhat differently, as follows:

- If you use the DSN command and its subcommands infrequently, place **only** *prefix.SDSNLINK* in the LNKLSTxx member of SYS1.PARMLIB. Provide the necessary STEPLIB or JOBLIB statements in your TSO logon procedures or in your JCL if you are using batch.
- If you use the DSN command and its subcommands frequently, you might also want to move the TSO attachment facility load modules to a library that is defined in the LNKLSTxx. The TSO attach modules are DSNECP00, DSNECP10, DSNESM00, and DSNELI.
- If you use the call attachment facility (CAF) frequently, move the CAF load modules (DSNACAB, DSNACAF, and DSNALI) to a library that is defined in the LNKLSTxx.
- If you use the RRS attachment facility (RRSAF) frequently, move the RRSAF load modules (DSNARRS and DSNRLI) to a library that is defined in the LNKLSTxx.
- If you use the CAF, RRSAF, or the DSN command and its subcommands frequently, you can move the eligible load modules to a library that is defined in the link pack area (LPA), in IEALPAXx member of SYS1.PARMLIB. The CAF and DSN load modules must reside below the 16 MB line of z/OS virtual storage.
  - The TSO load modules that you can place in the LPA are DSNECP00, DSNECP10, DSNESM00, and DSNELI. If you include these modules in the LPA, remember to include the appropriate aliases for DSNECP00 (DSN) and DSNELI (DSNHLI).
  - The CAF load modules that you can place in the LPA are DSNACAF and DSNALI. If you include these modules in the LPA, remember to include the appropriate alias for DSNALI (DSNHLI2). Do not include DSNACAB in the LPA because it is a data-area-only, non-executable load module.
  - The RRSAF load modules that you can place in the LPA are DSNARRS and DSNRLI. If you include these modules in the LPA, you must include the appropriate alias for DSNRLI (DSNHLIR).

**Attention:** If modules are moved or copied from one library to another, you must make changes to SMP/E control data to reflect the movement. If you do not make these changes, future service or changes to the modules will not be processed correctly.

## Naming conventions for DB2 library names

You need to modify the DB2 library data set names in the SMP/E jobs.

These data sets are listed in Table 1 of What you produce. Their names are composed of three parts:

- A user-defined prefix
- A fixed base name: for example, SDSNLOAD



- An optional user-defined suffix

The DB2 10 default prefix (*prefix*) is used in this information; the default suffix is null. You need to edit each of the DB2 SMP/E jobs and follow the directions in the header notes of each job to specify the names of the SMP/E data sets. If you want to add a suffix, edit the SMP/E procedures and allocation jobs. The prefix cannot exceed 18 characters. The suffix cannot exceed 17 characters, minus the length of the prefix. In addition, any data set names that exceed eight characters must be in groups of no more than eight characters, separated by periods. The qualified data set name cannot exceed 44 characters.

You can also change the base name of these libraries or load them into another data set. If you do this, however, you might need to do additional editing of the installation or migration jobs. The DSNTINST CLIST, which you use later to tailor the installation and migration jobs, uses the following default data set names:

<i>prefix</i> .ADSNLOAD	<i>prefix</i> .SDSNMACS
<i>prefix</i> .SDSNCLST	<i>prefix</i> .SDSNSAMP
<i>prefix</i> .SDSNEXIT	<i>prefix</i> .DBRMLIB.DATA
<i>prefix</i> .SDSNLINK	<i>prefix</i> .RUNLIB.LOAD
<i>prefix</i> .SDSNLOAD	<i>prefix</i> .SRCLIB.DATA
<i>prefix</i> .SDSNDBRM	<i>prefix</i> .SDSNIVPD
<i>prefix</i> .SDXRRESL	<i>prefix</i> .SDSNC.H

**Recommendation:** Use the supplied naming convention.

Document any changes you make to the library names in the SMP/E jobs. You must specify these library names again during the ISPF tailoring session.


## Specifying SMP/E data set options

You have several options regarding how you establish and use SMP/E data sets.

### About this task

You must decide whether you want DB2 and IMS to share SMP/E data sets. You must also decide whether you need an additional set of SMP/E data sets. An additional set of SMP/E data sets is required if you support more than one release of DB2.

**Related information:**

 [SMP/E for z/OS: User's Guide](#)

### Sharing SMP/E data sets with IMS

DB2 and z/OS cannot share SMP/E data sets because some module names and macro names are common to both products. Under certain conditions, however, DB2 can share SMP/E data sets with IMS.

### About this task

If you do not share SMP/E data sets with IMS, skip this step.

The allocation job DSNALLOC defines a new set of SMP/E data sets that DB2 and IMS are to share.

## Procedure

To define sharing of SMP/E data sets between DB2 and IMS:

You must modify your allocation job for either of the following situations:

- **Situation 1:** You decide to have separate SMP/E data sets for DB2 and IMS. In certain situations, DB2 and IMS cannot share SMP/E data sets. You must have separate SMP/E data sets if you want to have two IRLMs.

Even if you are not required to have separate SMP/E data sets, you might want to keep them separate. If DB2 and IMS share the SMP/E data sets, you need to accept or reapply DB2 corrective service to these data sets to allow IMS SYSGENs.

To establish separate SMP/E data sets for DB2 and IMS, change the data set prefix that your allocation job uses to a value other than the prefix that you use for your current IMS SMP/E data sets. The allocation jobs use the prefix "IMS". Changing this prefix prevents the allocation job from replacing your current SMP/E data sets and still allows it to create new SMP/E data sets.

- **Situation 2:** You decide to share SMP/E data sets between DB2 and IMS, but you want to use the SMP/E data sets that already exist for IMS. To do this, remove the data set allocation and initialization statements from your allocation job. When you run the job, no SMP/E data sets are created, and DB2 then shares the existing SMP/E data sets with IMS.

## SMP/E data sets for two releases

A single set of SMP/E zone structures can record only one release of DB2. Maintaining separate zone structures for both DB2 10 and your previous release is strongly recommended until you are sure that you will not need to fall back.

The SMP/E jobs that are provided with DB2 assume that you will allocate a new set of SMP/E data sets for the new release. When you run your allocation job (DSNALLOC), it creates a set of SMP/E data sets. If you choose to reuse your Version 8 or DB2 9 zone structure, you can run job DSNTIJUD to delete SMP/E data for Version 8 or DB2 9. However, after you run this job, you cannot fall back to your previous release.

You can create an additional set of SMP/E data sets either by copying them from a prior release of DB2 or by allocating a new set. Allocating a new set is faster because no data must be deleted.

**Recommendation:** Copy a prior set so that you can then perform service regression checking.

## Specifying a new SMP/E prefix for IRLM

The SMP/E prefix in the SMP/E jobs is the same for the new IRLM as for the old IRLM. Consequently, if you do not change the SMP/E prefix, the jobs overwrite your old IRLM.

## Procedure

If you do not want the jobs to overwrite your old IRLM:

Edit the SMP/E jobs accordingly.

---

## What you produce

During SMP/E processing, DB2 is loaded into the distribution and target libraries. DB2 uses the distribution libraries to maintain DB2 and contain the master copy of all elements for your DB2 subsystem.

The target libraries contain the various DB2 components. DB2 target libraries are updated when you apply corrective service.

The following table describes all the DB2 distribution libraries. The distribution libraries contain the master copy of all elements for your DB2 system.

*Table 30. DB2 distribution libraries*

<b>Distribution libraries</b>	<b>Description</b>
<i>prefix</i> .ADSNBASE	This library contains all jobs that are required to complete SMP/E installation.
<i>prefix</i> .ADSNENU or <i>prefix</i> .ADSNDKF	This library contains the DB2 English or Kanji task panels, respectively.
<i>prefix</i> .ADSNLOAD	This library contains an individual object module for every DB2 load module. It contains the IRLM load modules if you choose to install IRLM into the same distribution libraries as DB2. This library must be a PDSE data set.
<i>prefix</i> .ADSNLOD2	This library contains a PDSE data set, which contains JDBC and SQLJ DLLs.
<i>prefix</i> .ADSNHFS	This library contains the data that is to be copied into z/OS UNIX System Services.
<i>prefix</i> .ADSNIVPD	This library contains the IVP input data and expected output for sample applications.
<i>prefix</i> .ADSNMACS	This library contains the DB2 macros, sample programs, sample data, initialization data, TSO CLISTS, ISPF panels, and ISPF messages.
<i>prefix</i> .ADXRLLOAD	This library contains an individual object module for every IRLM load module.
<i>prefix</i> .ADXRSAMP	This library contains the installation procedures for installing IRLM Version 2.

The following table describes all DB2 target libraries.

*Table 31. DB2 target libraries*

<b>Target libraries</b>	<b>Description</b>
<i>prefix</i> .SDSNBASE	This library contains all jobs that are required to complete SMP/E installation.
<i>prefix</i> .SDSNC.H	This library contains the header files. The command-line interface (CLI) requires header files. C language application programs can use header files.
<i>prefix</i> .SDSNCLST	This TSO CLIST library contains code that simplifies the process of installing and migrating, aids program preparation and the use of DB2 utilities, and allows the use of DB2 Interactive (DB2I).
<i>prefix</i> .SDSNDBRM	This library contains the system DBRMs for DB2 10.

Table 31. DB2 target libraries (continued)

Target libraries	Description
<i>prefix</i> .SDSNEXIT	This program library is empty when first created. The installation jobs put the DSNZPxxx subsystem parameters load module, application defaults load module ( <i>dsnhdecpl</i> ), and user exit modules into this library.
<i>prefix</i> .SDSNIVPD	This library contains the IVP input data and the expected output for sample applications.
<i>prefix</i> .SDSNLINK	This library contains early code of DB2 10.
<i>prefix</i> .SDSNLOAD	This library contains DB2 10 load modules. This library must be a PDSE data set.
<i>prefix</i> .SDSNLOD2	This library contains the PDSE data set, which contains JDBC and SQLJ DLLs.
<i>prefix</i> .SDSNMACS	This macro library contains macros that are needed for the CICS and IMS attachment facilities, the initialization parameter macros, and some data-mapping macros that are needed for some applications.
<i>prefix</i> .SDSNPFPE or <i>prefix</i> .SDSNPFPK	<i>prefix</i> .SDSNPFPE contains the English task and help panels, and <i>prefix</i> .SDSNPFPK contains the Kanji task and help panels.
<i>prefix</i> .SDSNSAMP	This initialization library contains the sample applications and data, the jobs for installing and migrating, the default installation and migration parameters, and catalog initialization data for DB2. The JCLIN for each FMID is stored in this library.
<i>prefix</i> .SDSNSPFM	This DB2 ISPF message library contains messages that are issued during installation or migrate processing.
<i>prefix</i> .SDSNSPFP	This library is the DB2 ISPF library for installation task and help routing panels.
<i>prefix</i> .SDSNSPFS	This library is the DB2 ISPF skeleton library that is used to produce EDITJCL.
<i>prefix</i> .SDSNSPFT	This library is the DB2 ISPF command table library.
<i>prefix</i> .SDXRRESL	This library contains the IRLM load modules. This library might be empty if you chose to install IRLM elsewhere.
<i>prefix</i> .SDXRSAMP	The IRLM samples library might be empty if you chose to install IRLM elsewhere.

For a description of each SMP/E job that DB2 provides, see the following table. These jobs allocate the DB2 libraries and load them with the data from the installation tapes or cartridges.

Table 32. List of SMP/E jobs

Job name	Description
DSNTIJAA	This job creates the DB2 target and distribution zones, and defines the SMP/E control data sets in these zones and in the SMP/E global zone.
DSNACEP1	This job invokes SMP/E to accept all the required and additional FMIDs into the DB2 distribution libraries (DLIBs).
DSNALLOC	This is the SMP/E allocation job. It creates the DB2 target and distribution libraries and defines the libraries in the SMP/E target and distribution zones for DB2 for the required and optional FMIDs.

Table 32. List of SMP/E jobs (continued)

Job name	Description
DSNISMKD	This sample job invokes the supplied DSNMKDIR EXEC to allocate HFS paths for JDBC and SQLJ.
DSNL SMK D	This sample job invokes the supplied DSNLMKDR EXEC to allocate HFS paths for MQListener.
DSNWSMKD	This sample job invokes the supplied DSNWMKDR EXEC to allocate HFS paths for Web Services Object Runtime (WORF).
DSNAPPL1	This job invokes SMP/E to apply all the FMIDs to the DB2 target libraries for the required and additional FMIDs.
DSNRECV1	This job invokes SMP/E to receive all the required FMIDs (from both tapes or cartridges) from the base tape into the SMP/E control data sets.
DSNRECV2	This job invokes SMP/E to receive all the required FMIDs (from both tapes or cartridges) for IRLM into the SMP/E control data sets.
DSNRECV3	This job invokes SMP/E to receive all the additional FMIDs (from both tapes or cartridges) for ODBC, JDBC, and SQLJ into the SMP/E control data sets.
DSNRECV4	This job invokes SMP/E to receive FMIDs (from both tape or cartridge) for the Kanji DB2I panels into the SMP/E control data sets.
DSNTIJUD	This job invokes SMP/E to delete all Version 8 or DB2 9 entries from the SMP/E libraries.
DSNDDEF1	This job creates DDDEF entries for the SMP/E target and distribution libraries.

## DB2 utilities packaging

Several utilities are included with DB2 at no extra charge. Other utilities are available as a separate product.

The following utilities are core utilities, which are included (at no extra charge) with DB2 10 for z/OS:

- CATENFM
- CATMAINT
- DIAGNOSE
- LISTDEF
- OPTIONS
- QUIESCE
- REPAIR
- REPORT
- TEMPLATE
- All DSN stand-alone utilities

All other utilities are available as a separate product called the DB2 Utilities Suite for z/OS (5655-V41, FMID JDBAA1K), which includes the following utilities:

- BACKUP SYSTEM
- CHECK DATA
- CHECK INDEX
- CHECK LOB
- COPY

- COPYTOCOPY
- EXEC SQL
- LOAD
- MERGECOPY
- MODIFY RECOVERY
- MODIFY STATISTICS
- REBUILD INDEX
- RECOVER
- REORG INDEX
- REORG TABLESPACE
- RESTORE SYSTEM
- RUNSTATS
- STOSPACE
- UNLOAD

All DB2 utilities operate on catalog, directory, and sample objects, without requiring purchase of the DB2 Utilities Suite for z/OS.

## SMP/E jobs for DB2 utility products

To load the DB2 utility products, use System Modification Program Extended (SMP/E). SMP/E processes the installation cartridges and creates DB2 distribution target libraries.

DB2 provides several jobs that invoke SMP/E. These jobs are on the cartridge that you received with the utility product:

### SMP/E RECEIVE job, DSNRECVK

Job DSNRECVK, loads the DB2 Utilities Suite DB2 10 program modules, macros, and procedures into temporary data sets (SMPTLIBs). If these jobs fail or abnormally terminate, correct the problem and rerun the jobs.

### SMP/E APPLY job, DSNAPPLK

Job DSNAPPLK, copies and link-edits the program modules, macros, and procedures for the DB2 Utilities Suite DB2 10 into the DB2 target libraries.

### SMP/E ACCEPT job, DSNACCPK

Job DSNACCPK, copies the program modules, macros, and procedures for the DB2 Utilities Suite DB2 10 into the DB2 distributed libraries.

The prologue for each job contains directions for tailoring the job for your site. Follow the instructions carefully to ensure that your SMP/E process for DB2 Utilities Suite for z/OS works correctly.

For detailed instructions for installing the DB2 Utilities Suite for z/OS product, see the *DB2 Utilities Suite for z/OS Program Directory*.

#### Related concepts:

 System installation and maintenance using SMP/E (z/OS basic skills)

#### Related information:

 DB2 for z/OS Program Directories

## Operation of DB2 utilities in a mixed-release data sharing environment

The utilities batch module, DSNUTILB, is split into multiple parts: a release-independent module called DSNUTILB, a release-dependent module DSNUT101, and utility-dependent load modules.

To operate in a mixed-release data sharing environment, you must have the following modules available to the utility jobs that operate across the data sharing group:

- The release-dependent modules from both releases
- All applicable utility-dependent modules

**Related reference:**

Load module names for running purchased utilities in coexistence





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## Chapter 4. Tailoring DB2 jobs to your environment using the installation CLIST

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with DB2 subsystem parameters.

### About this task

The values that you enter or accept on the ISPF panels describe the operating characteristics of your DB2 system. If you change the default values when you install DB2 or when you migrate to a newer release, the CLIST verifies that the values that you enter are within the allowable ranges. After a successful installation or migration, you can subsequently update these values to improve your operations.

Running the installation CLIST also prepares the jobs that are required for installation or migration. The CLIST tailors each installation or migration job according to the values that you specify on the ISPF panels.

**Tip:** You can capture most settings of an existing DB2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see Updating the CLIST defaults input member: job DSNTIJXZ and DSNTXAZP tool.

**Important:** If you use the installation CLIST, do not change any members in your *prefix.SDSNSAMP* library. If you do, the installation CLIST can fail or produce unpredictable results when tailoring the installation or migration jobs.

### Related tasks:

#### From V8

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8

#### From V8

#### From V9.1

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1

#### From V9.1

Updating the CLIST defaults input member: job DSNTIJXZ

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## Running the installation CLIST

To use the ISPF panels, you must first make the DB2 ISPF library available to TSO and then invoke the installation CLIST DSNTINST in ISPF mode. Save the output that the panel session produces to use later.

## About this task

The installation CLIST allocates several data sets for input/output. From your TSO user ID, you should be able to allocate these data sets to the permanent or temporary unit names that are provided on installation panel DSNTIPA2. These devices can be defined by an esoteric device group.

### Related concepts:

 [DASD Device Allocation \(MVS Initialization and Tuning Guide\)](#)

## Making the DB2 ISPF libraries available to TSO

Before you can invoke the CLIST, you need to make the DB2 ISPF libraries available to TSO.

### Procedure

To make the DB2 ISPF libraries available to TSO, use one of the following approaches to concatenate the DB2 ISPF libraries to your normal allocations:

- To prepare for running only the DB2 installation CLIST, issue the following commands:

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSEXEC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' +
'ISP.SISPPENU') SHR REUSE
```

- To prepare for running the DB2 installation CLIST and the DB2 Interactive (DB2I) facility, issue the following commands. If you use Kanji DB2I panels, concatenate SDSNPFPK to ISPPLIB instead of SDSNPFPE.

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE
```

The PROFILE command provides complete error messages.

The ALLOCATE command uses the default names of the libraries that contain the ISPF panels. These ISPF library names might be different at your site. To concatenate or merge existing libraries with them, put the library names in the list of names in parentheses after DSN with the largest block size first. (If two or more libraries have the same block size, you can list either one first.)

## Updating the CLIST defaults input member: job DSNTIJXZ

Before you run the CLIST to migrate to DB2 10, update an existing DB2 10 subsystem, or install DB2 10 using the settings of an existing DB2 10 subsystem, update your defaults input member.

### Before you begin

Ensure that you have configured Resource Recovery Services (RRS).

## About this task

The DSNTIDxx defaults input member contains, the subsystem parameter settings, buffer pool settings, and other settings from an existing subsystem. It is used as input during your migration, update, or installation.

You can use job DSNTIJXZ to create an updated defaults input member, DSNTIDxx, which contains most of the settings from your current subsystem. Running this job reduces the effort of manually comparing settings in your current DSNTIJUZ job with the values that are defined in the defaults input member.

Before running this job, you might need to bind or refresh the package and plan for the DSNTXAZP program. The necessary bind commands are in installation job DSNTIJSG.

## Procedure

To update the CLIST defaults input member:

1. Obtain the correct version of the DSNTIJXZ job.
  - If you are preparing to migrate to DB2 10, use the Version 8 or DB2 9 DSNTIJXZ job to create an updated migration input member for the DB2 10 installation CLIST. For example, if you are migrating from DB2 9, use the DB2 9 DSNTIJXZ job.
  - If you are preparing to update an existing DB2 10 subsystem or install DB2 10 using the settings of an existing DB2 10 subsystem, use the DB2 10 DSNTIJXZ job to create an updated input member.
2. Configure and run job DSNTIJXZ.
  - If you are preparing to migrate to DB2 10, specify as input your existing Version 8 or DB2 9 DSNTIDxx member. This member is the one that was created when you installed or migrated to Version 8 or DB2 9. If you do not have this member, specify as input the Version 8 or DB2 9 DSNTIDXA member.  
For DB2 data sharing, verify that job DSNTIJXZ runs on the data sharing member that you are preparing to migrate and that the input to job DSNTIJXZ is the DSNTIDxx member for that data sharing member.
  - If you are preparing to update an existing DB2 10 subsystem or install DB2 10 using the settings of an existing DB2 10 subsystem, specify as input your existing DB2 10 DSNTIDxx member. This member is the one that was created when you installed or migrated to DB2 10. If you do not have this member, specify as input the DB2 10 DSNTIDXA member, or the DSNTIDXB member if you use SAP.

Job DSNTIJXZ uses the DSNTXAZP tool to create a copy of the specified DSNTIDxx member and update it with the current subsystem parameter settings, buffer pool settings, and other installation settings.

**Important:** The DSNTXAZP tool does not update the DSNTIDxx CLIST input member with current settings for the following parameters or panel fields. Update the values as you complete the CLIST, or modify the values directly in the DSNTIDxx member:

Table 33. Settings not updated by the DSNTXAZP tool

CLIST Panel	Field Name (DSNTID <sub>xx</sub> entry)
DSNTIPA2	The following fields: CATALOG ALIAS (VCATALOG) DEFINE CATALOG (VCATSTAT)
DSNTIPA3	All fields: PERMANENT UNIT NAME (VOLSDEVT) TEMPORARY UNIT NAME (TVOLSDEVT) CLIST ALLOCATION: VOL/SER (VOLSDAT1) CLIST ALLOCATION: DATA CLASS (DATACLS1) CLIST ALLOCATION: MGMT CLASS (MGMTCLS1) CLIST ALLOCATION: STOR CLASS (STORCLS1) NON-VSAM DATA: VOL/SER (VOLSDAT2) NON-VSAM DATA: DATA CLASS (DATACLS2) NON-VSAM DATA: MGMT CLASS (MGMTCLS2) NON-VSAM DATA: STOR CLASS (STORCLS2) VSAM CATALOG, ...: VOL/SER (VOLSDAT3) VSAM CATALOG, ...: DATA CLASS (DATACLS3) VSAM CATALOG, ...: MGMT CLASS (MGMTCLS3) VSAM CATALOG, ...: STOR CLASS (STORCLS3) LOG COPY 1, BSDS 2: VOL/SER (VOLSDAT6) LOG COPY 1, BSDS 2: DATACLASS (DATACLS6) LOG COPY 1, BSDS 2: MGMTCLASS (MGMTCLS6) LOG COPY 1, BSDS 2: STOR CLASS (STORCLS6) LOG COPY 2, BSDS 1: VOL/SER (VOLSDAT7) LOG COPY 2, BSDS 1: DATA CLASS (DATACLS7) LOG COPY 2, BSDS 1: MGMT CLASS (MGMTCLS7) LOG COPY 2, BSDS 1: STOR CLASS (STORCLS7)

Table 33. Settings not updated by the DSNTXAZP tool (continued)

CLIST Panel	Field Name (DSNTID <sub>xx</sub> entry)
DSNTIPK	The following fields: WORK FILE DB (WKDBNAME) SUBGRP ATTACH (SGRPATNM)
DSNTIPH	The following fields: COPY 1 NAME (BSDSNAM1) COPY 2 NAME (BSDSNAM2) Active logs: COPY 1 PREFIX (LOGSPRE1) Active logs: COPY 2 PREFIX (LOGSPRE2) Archive logs: COPY 1 PREFIX (ARCHPRE1) Archive logs: COPY 2 PREFIX (ARCHPRE2)
DSNTIPT	All fields: TEMP CLIST LIBRARY (NEWCL) SAMPLE LIBRARY (NEWSAMP) CLIST LIBRARY (OUTCL) APPLICATION DBRM (DBRMLIB) APPLICATION LOAD (RUNLIB) DECLARATION LIBRARY (SRCLIB) LINK LIST LIBRARY (DSNLINK) LOAD LIBRARY (DSNLOAD) JDBC AND SQLJ DLLS (DSNLOD2) MACRO LIBRARY (DSNMACS) LOAD DISTRIBUTION (DSNALOAD) EXIT LIBRARY (DSNEXIT) DBRM LIBRARY (DSNDBRM) IRLM LOAD LIBRARY (DSNIRLM) IVP DATA LIBRARY (DSNIVPD) INCLUDE LIBRARY (DSNCHDRS)
DSNTIPU	All fields: IBM LE RUNTIME LIBRARY (LERUN) IBM LE RUNTIME LIBRARY 2 (LERUN2) IBM LE LINK EDIT LIB (LELKED) IBM LE PRELINK MSG LIB (LEPLMSG) HIGH LEVEL ASSEMBLER LIB (IASMLIB) C/CPP COMPILER MODULE (CPROG) C/CPP COMPILER LIBRARY (CCOMP) C/CPP HEADER LIBRARY (CHDRS) C/370 COMPILER MESSAGES (CMMSG) C LE PRELINKER PHASE (CPRLK) CPP LE PRELINKER PHASE (CPPPRLK) CPP CLASS LIB HEADERS (CPPHDRS) CPP AUTO CALL LIBRARY (CPPAUTCL) CPP CLASS LIBRARY (CPPCLASS) CPP PROCEDURE LIBRARY (CPPPROC)

Table 33. Settings not updated by the DSNTXAZP tool (continued)

CLIST Panel	Field Name (DSNTID <sub>xx</sub> entry)
DSNTIPW	All fields: SYSTEM MACLIB (MACLIB) SYSTEM PROCEDURES (PROCLIB) SORT LIBRARY (SORTLIB) IMS RESLIB (RESLIB) ISPF ISPLINK MODULE (ISPLOAD) GDDM MACLIB (GDDMMACS) GDDM LOAD MODULES (GDDMLOAD) CICS LOAD LIBRARY (CICSMOD) CICS MACRO LIBRARY (CICSMAC) CICS COBOL LIBRARY (CICSCOB) CICS PL/I LIBRARY (CICSPLI) CICS EXCI LIBRARY (CICSEHCI)
DSNTIPD	All fields: DATABASES (NUMDATAB) TABLES (NUMTABLE) COLUMNS (NUMCOLUM) VIEWS (NUMVIEWS) TABLE SPACES (NUMTABSP) PLANS (NUMPLANS) PLAN STATEMENTS (NUMSTMTS) PACKAGES (NUMPKGS) PACKAGE STATEMENTS (NUMPKSTS) PACKAGE LISTS (NUMPLPL) EXECUTED STMTS (NUMSTMTE)
DSNTIP9	All fields: 4K SORT PRIMARY SPACE (S4KSPAC) 4K SORT WORK TS'S (S4KNOTS) 4K SORT WORK SEG SIZE (S4KSGSZ) 32K SORT PRIMARY SPACE (S32KSPAC) 32K SORT WORK TS'S (S32KNOTS) 32K SORT WORK SEG SIZE (S32KSGSZ) 4K TEMP PRIMARY SPACE (T4KSPAC ) 4K TEMP WORK TS'S (T4KNOTS) 4K TEMP WORK SEG SIZE (T4KSGSZ) 32K TEMP PRIMARY SPACE (T32KSPAC) 32K TEMP WORK TS'S (T32KNOTS)
DSNTIPM	The following fields: SUBSYSTEM NAME (MVSNAME) COMMAND PREFIX (MVSPREF)
DSNTIPR	The following fields: DB2 LOCATION NAME (DDLLOC) DB2 NETWORK LUNAME (DDLUNAM)

Table 33. Settings not updated by the DSNTXAZP tool (continued)

CLIST Panel	Field Name (DSNTIDxx entry)
DSNTIP5	The following fields: DRDA PORT (DRDAPRT) RESYNC PORT (RESYNPRT)
DSNTIPX	The following fields: WLMENV (WLMENV)
DSNTIPR1	The following fields: All fields (WLMENVx).
DSNTIPRA	On panels DSNTIPRB - DSNTIPRQ: All WLM ENV NAME fields (RTxmWLM)
DSNTIPY	All numbered job card information fields.

- When you run the CLIST, specify the DSNTIDxx member that is created by this job during instillation or migration:
  - For migration, specify the DSNTIDxx member that is created by this job in the DATA SET(MEMBER) NAME field on panel DSNTIPA1.
  - During installation, or for updates, specify the DSNTIDxx member that is created by this job in the INPUT MEMBER NAME field on panel DSNTIPA1.

**Related reference:**

DATA SET(MEMBER) NAME field

INPUT MEMBER NAME field

Directory of subsystem parameters, panel fields, and application default values

**DSNTXAZP tool**

The DSNTXAZP tool updates a CLIST defaults input member (DSNTIDxx) with certain current subsystem parameter and buffer pool settings that are defined in a specified DB2 subsystem.

Job DSNTIJXZ invokes the DSNTXAZP tool.

The DSNTXAZP tool requires Resource Recovery Services (RRS).

The DSNTXAZP tool does not update all entries in the DSNTIDxx member. For a list of entries that are not updated, see Updating the CLIST defaults input member: job DSNTIJXZ.

The batch program requires the following arguments:

```
//STEP01 EXEC PGM=DSNTXAZP,PARM='ssid action'
```

ssid is the subsystem ID.

action is one of the following values:

**UPDATE\_ALL**

Creates a new CLIST defaults input member and updates it with the current subsystem parameter and buffer pool settings.

**UPDATE\_BPOOL**

Creates a new CLIST defaults input member and updates it with the current buffer pool settings only (no subsystem parameter changes).

**UPDATE\_ZPARAM**

Creates a new CLIST defaults input member and updates it with the current subsystem parameter settings only (no buffer pool changes).

The following DD statements are required for processing:

**XAINPUT**

Used as input to the DSNTXAZP program. It allocates the current CLIST defaults input member that will be used as the source for creating a new CLIST defaults input member. The version of the member should match the version of the selected DB2 subsystem.

**XAOUTPUT**

Used as output by the DSNTXAZP program. It allocates the generated CLIST defaults input member with updated subsystem parameter and buffer pool settings. This should be a member of a PDS that is defined with RECFM=FB, LRECL=80.

**SYSPRINT**

Used as output by the DSNTXAZP program for informational and error messages. It also contains a report on the parameters that were processed and modified. For additional details on the report, see the example below.

The following JCL is an example of running the tool:

```
//DSNTIXZ EXEC PGM=DSNTXAZP,PARM='DSN UPDATE_ALL'
//XAINPUT DD DSN=prefix.SDSNSAMP(DSNTIDXA),DISP=SHR
//XAOUTPUT DD DSN=prefix.SDSNSAMP(DSNTIDNU),DISP=SHR
//SYSPRINT DD SYSOUT=*
```

The tool generates a CLIST input member with the current subsystem parameter settings, buffer pool settings, or both, and the following prolog:

```
* ****
*   CREATED MEMBER = MY.DATASET.NAME(DSNTIDNU)
*
*   CREATED ON = MAR 24, 2010 11:12:30
*
*   SOURCE MEMBER = MY.SOURCE.NAME(DSNTIDXA)
*
*   DESCRIPTIVE NAME = DB2 INSTALLATION DATA
*
*   FUNCTION = PROVIDE UPDATED VALUES FOR MIGRATING TO A NEW RELEASE
*              OF DB2 OR INSTALLING A NEW RELEASE OF DB2
*
*   PARAMETERS:
*     PARM NAME = NAME FOR ISPF PANEL VARIABLE
*     PARM TYPE = TYPE FOR VALIDITY CHECKING
*     DS SCP    = DATA SHARING SCOPE: G = GROUP, M = MEMBER
*     MIN, MAX  = RANGE VALUES FOR VALIDITY CHECKING
*     CURRENT VALUE = VALUE USED AS INPUT FOR NAMED ISPF VARIABLE
*
* ****
* ****
* PARM  PARM DS  MIN          MAX          CURRENT *
* NAME  TYPE SCP VALUE      VALUE      VALUE   *
* ****
```

In addition to creating a new CLIST input member, the DSNTXAZP tool provides a report of all parameters. The report indicates whether each parameter was updated or if the original value from the input member was retained. It also shows the mapping between the subsystem parameter and the CLIST parameter. This is a sample report:



-----  
 CLIST PARAMETER REPORT:

0001 PARAMETER NAME = ABEXP  
 ZPARAM/BUFFERPOOL PARAMETER = ABEXP  
 PARAMETER TYPE = CHAR  
 DATA SHARING SCOPE = M  
 MINIMUM VALUE = NO  
 MAXIMUM VALUE = YES  
 CURRENT CLIST VALUE = YES  
 CURRENT INSTALLED VALUE = YES  
 STATUS = RETAINED

0002 PARAMETER NAME = ABIND  
 ZPARAM/BUFFERPOOL PARAMETER = ABIND  
 PARAMETER TYPE = CHAR  
 DATA SHARING SCOPE = M  
 MINIMUM VALUE = NONE  
 MAXIMUM VALUE = NONE  
 CURRENT CLIST VALUE = YES  
 CURRENT INSTALLED VALUE = NO  
 STATUS = UPDATED

:  
 nnnn PARAMETER NAME = DB2REL  
 ZPARAM/BUFFERPOOL PARAMETER = N/A  
 PARAMETER TYPE = CHAR  
 DATA SHARING SCOPE = M  
 MINIMUM VALUE = NONE  
 MAXIMUM VALUE = NONE  
 CURRENT CLIST VALUE = 1010  
 CURRENT INSTALLED VALUE = N/A  
 STATUS = RETAINED

:  
 CHANGE SUMMARY REPORT:

CLIST PARAMETER	ZPARAM/BUFFERPOOL PARAMETER	VALUE
ABEXP	-SAME-	YES
* ABIND	-SAME-	NO (YES)
:		
* BP0_VPSEQT	BP0 VPSEQT	50 (35)
* BP0_DWQT	BP0 DWQT	50 (35)
* BP0_VDWQT	BP0 VDWQT	10,0 (20)
:		
BUFMAX00	BPO VPSIZE	20000
:		
DB2REL	-NONE-	1010
:		
* NUMCONCR	CTHREAD	220 (200)
OVDSMAX	DSMAX	20000
:		

-----  
 SOURCE MEMBER : *prefix*.SDSNSAMP(DSNTIDXA)  
 CREATED MEMBER : DB2.CLIST.MEMBER(DSNTIDX0)  
 PARAMETERS PROCESSED : n  
 PARAMETERS MODIFIED : m  
 -----

**Related reference:**

Directory of subsystem parameters, panel fields, and application default values

**Related information:**

## Multiple procedure libraries

If your z/OS system has multiple procedure libraries, ensure that the installation jobs access the appropriate set of procedures by specifying the order in which procedure libraries are searched.

You can use the following JCLLIB statement to specify the order in which procedure libraries are searched.

```
//ddname JCLLIB ORDER=(library[,library...])
```

The JCLLIB statement must follow the JOB statement and precede the first EXEC statement in the job. You can have DB2 insert this statement in your JCL for you by entering the statement on installation panel DSNTIPY.

### Related reference:

DSNTIPY: Job editing panel

[➞ JCLLIB statement \(MVS JCL Reference\)](#)

## System affinity for installation jobs

You must ensure that the installation jobs run on the z/OS system where the appropriate DB2 subsystem is running.

The following methods are a couple of the z/OS installation-specific ways to establish system affinity:

- For JES2 multi-access spool (MAS) systems, use the following JCL statement:

```
/*JOBPARM SYSAFF=cccc
```

Where *cccc* is the JES2 name. You can specify an asterisk (SYSAFF=\*) to indicate that the job should run on the system from which it was submitted.

- For JES3 systems, use the following JCL statement:

```
//*MAIN SYSTEM=(main-name)
```

The *main-name* is the JES3 name.

You can edit the jobs manually, or you can enter the preceding statements on installation panel DSNTIPY and have DB2 insert these statements for you.

Your installation might have other mechanisms for controlling where batch jobs run, such as by using job classes.

### Related reference:

DSNTIPY: Job editing panel

[➞ JES2 Control Statements \(MVS JCL Reference\)](#)

[➞ JES3 Control Statements \(MVS JCL Reference\)](#)

## Invoking the CLIST

After you make the DB2 ISPF libraries available to TSO, you can invoke the CLIST.

### Procedure

To invoke the CLIST:

1. Check your TSO logon region size. Usually 2 MB is enough.
2. Invoke ISPF.
3. Select option 6 on the main ISPF panel.

4. Invoke the installation CLIST.
5. Enter one of the following specifications:
 

```
EXEC 'prefix.SDSNCLST(DSNTINST)'
```

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CONTROL(LIST)'
```

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CHKOUTDS(NO)'
```

Use the second specification above if you want to receive the messages that trace the progress of the CLIST.

Use the third specification above if you want to use the CLIST but skip the verification of output data sets. By default, the CLIST verifies the following information when installation panels DSNTIPT and DSNTIPA1 are displayed:

- The CLIST verifies that the TEMP CLIST LIBRARY and SAMPLE LIBRARY that you specify on DSNTIPT can be allocated and opened for output.
- If you specify a value for OUTPUT MEMBER NAME on DSNTIPA1, the CLIST verifies that the data set *prefix.SDSNSAMP* can be allocated and opened for output.

## General instructions for using the installation CLIST

The CLIST reads a set of default values and displays them on the panels. The values can be the original default values that are supplied by IBM, values that you specified in a previous run of the CLIST, or values that were generated when you ran the DSNTXAZP tool.

**Tip:** You can capture most settings of an existing DB2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see Updating the CLIST defaults input member: job DSNTIJXZ and DSNTXAZP tool.

DSNT4781 BEGINNING EDITED DATA SET OUTPUT.

In general, you can change the default values to match the needs of your organization. However, some values cannot be changed, depending on the INSTALL TYPE value that you specify on panel DSNTIPA1, and whether you are installing the first or subsequent members of a data sharing group. At any point while you run the CLIST, you can save your changes in the output member that is specified on panel DSNTIPA1. To save your changes, enter SAVE in the command line of any installation panel, and choose option 1. The following panel is displayed when you enter SAVE in the command line:

```
+-----+
| DSNTIPSV                               |
| Save changes in progress:              |
|                                       |
| Select one.                            |
|  _ 1. Save and continue                 |
|  _ 2. Save and exit                     |
|    3. Continue without saving           |
|                                       |
| PRESS: ENTER to continue               |
| RETURN to exit                          |
+-----+
```

Figure 6. DSNTIPSV

### Related tasks:

Make DB2 CLISTs available to TSO and batch users (DSNTIJVC)

Make DB2 load modules available to TSO and batch users

**Related reference:**

DSNTXAZP tool

**Output from the panel session**

As output, the CLIST produces several data sets and a data set member.

Specifically, the panel session produces:

- A new data set member, if specified, that contains the resulting parameter values from the session. This member is stored in *prefix*.SDSNSAMP.
- A new data set, *prefix*.NEW.SDSNSAMP, that contains the edited JCL with the values that you entered on the panels.
- A new data set, *prefix*.NEW.SDSNTEMP, that contains tailored CLISTs for input to job DSNTIJVC, which is run during installation or migration.

Use job DSNTIJVC to combine the CLISTs into a common data set.

DB2 performs validity checking of the values that you enter during the panel sessions. If you receive an ISPF error message, press the HELP key for additional information.

The following figure illustrates by examples how the CLIST works during installation.

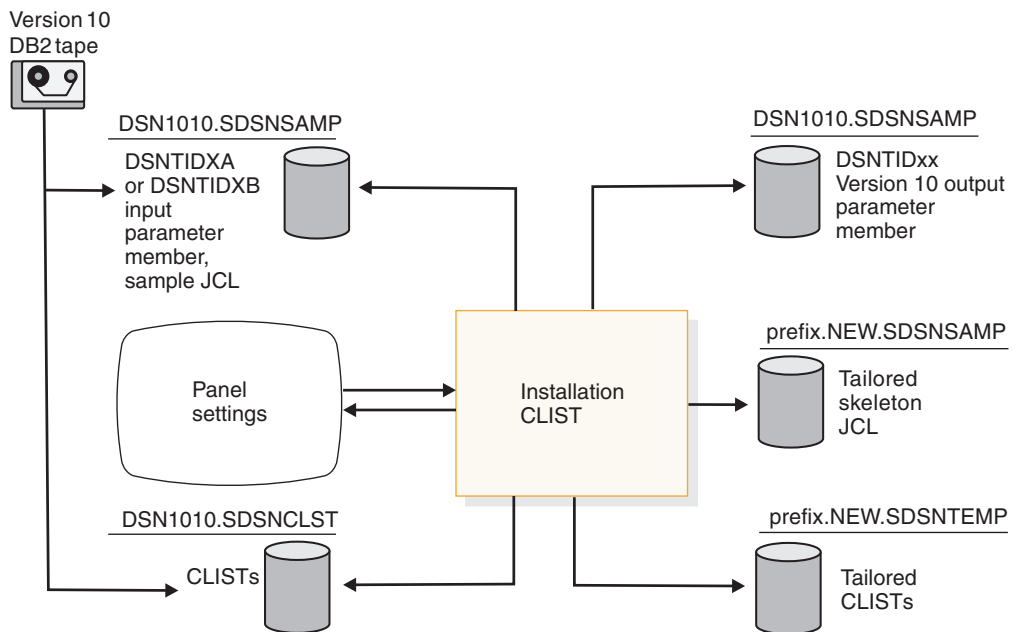


Figure 7. Examples of input to and output from the installation CLIST during installation

The following figure illustrates how the CLIST works during migration to conversion mode (from Version 8 or Version 9).

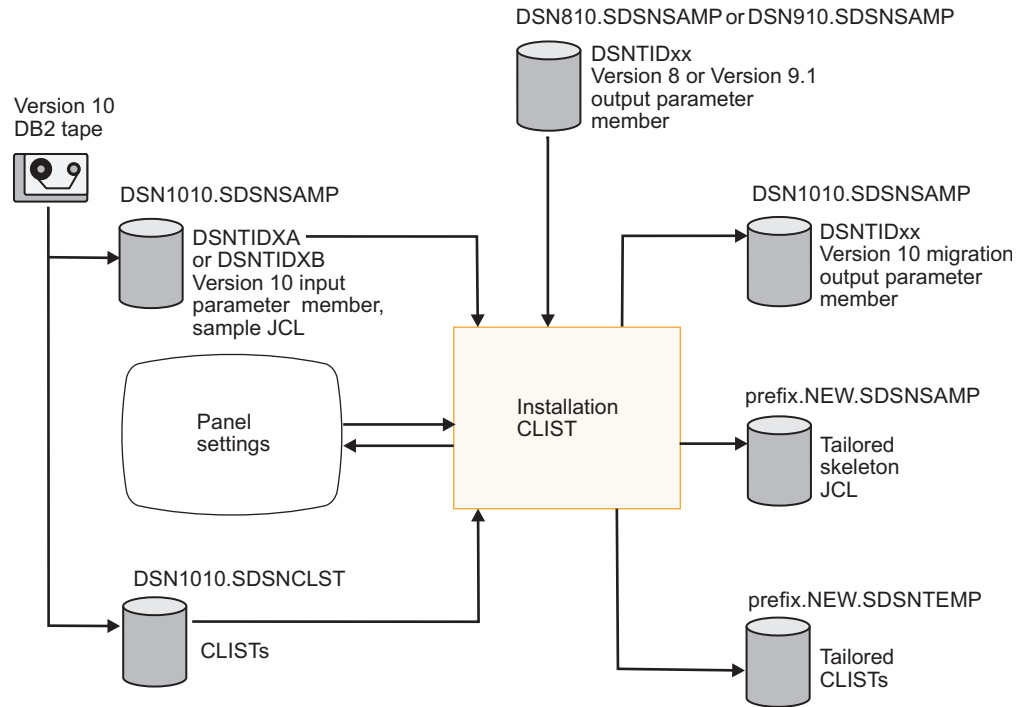


Figure 8. Examples of input to and output from the installation CLIST during migration to conversion mode (from Version 8 or Version 9)

The following figure illustrates how the CLIST works during migration to new-function mode.

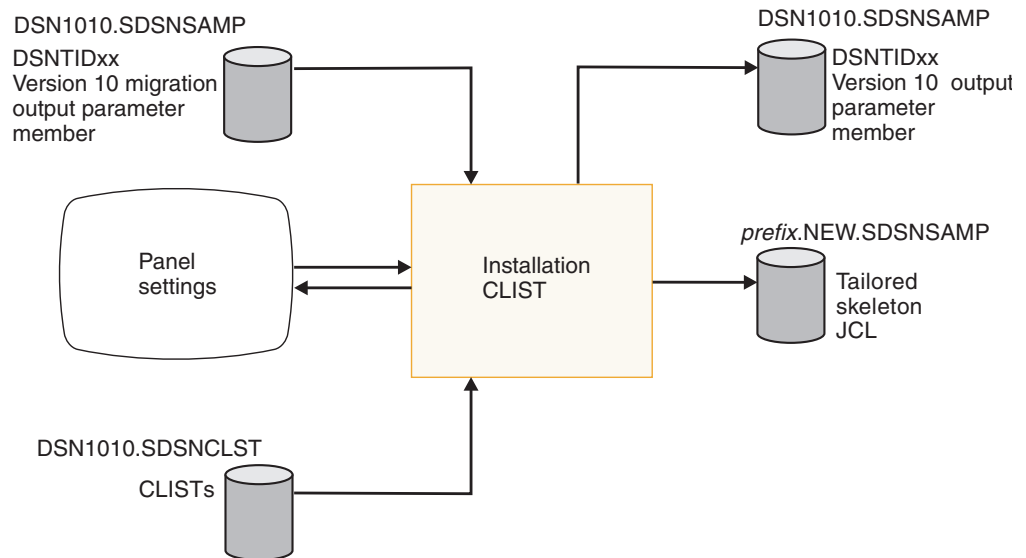


Figure 9. Examples of input to and output from the installation CLIST during migration to new-function mode

### Actions that are allowed on panels

All panel sequences begin with the Main Panel (DSNTIPA1).

**Preparation:** After the description of each parameter, record your choice for a value before you actually use the panels.

Panels that have fields that are marked with asterisks contain values that are primed on the basis of values from a previous panel. The following message is found on these panels:

```
DSNT444I SCROLLING BACKWARD MAY CHANGE FIELDS MARKED WITH ASTERISKS
```

If you scroll back to the panel that has the original value, the values on the succeeding panels are refreshed **only** if the original value is changed. If the values are changed, the following message is displayed:

```
DSNT443I VALUES MARKED WITH AN ASTERISK HAVE BEEN UPDATED
```

For example, panel DSNTIPH has fields that are marked with asterisks indicating values that are primed on the basis of the CATALOG ALIAS value on installation panel DSNTIPA2.

**Data entry:** Enter your choice on a panel in the space that is marked by an arrow (==>). Begin your entry in the second position to the right of the arrow. (The first position is protected; you cannot write in it.)

**Panel IDs:** If you want the panel IDs to appear on each panel, enter the following command from any panel:

```
PANELID ON
```

## Panel descriptions

Several terms are commonly used in the panel descriptions and panel field descriptions.

These terms include the following:

### Scrolling installation panels

The installation panels enable you to scroll back to previous panels to review or change values. The End key (usually PF3) takes you back to the previous panel. Pressing Enter continues to validate entries in the current panel and displays the next panel. If you want to exit completely from the installation process, use the Return key (usually PF4).

### Acceptable values

This part of a panel field description indicates the range or list of allowable values for an installation panel field. The acceptable values apply to the installation panel field, but not necessarily to the subsystem parameter that is associated with that field. Differences might occur if a panel field is used to determine the value of the associated subsystem parameter and the values do not correspond exactly.

If the maximum allowable value of a panel field is greater than 1024, in most cases you can use the equivalent K value. (The CLIST automatically multiplies the K value by 1024.) If the maximum allowable value is greater than 1,048,576, in most cases you can use the equivalent M value. (The CLIST automatically multiplies the M value by 1,048,576.)

If the maximum allowable value is greater than 1024 MB, in most cases you can use the equivalent G value. If the maximum allowable value is greater than 1024 GB, in most cases you can use the equivalent T value.

The maximum acceptable values might be too large for smaller systems; therefore, ensure that the values that you enter are valid for the size of your system.

### Default values

The default values that documentation shows are the original values that

are supplied by IBM. If you previously ran the CLIST and saved the updated panel values in a DSNTIDxx input data set, the previously entered values appear as default values on the panels.

**Tip:** You can capture most settings of an existing DB2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see Updating the CLIST defaults input member: job DSNTIJXZ and DSNTXAZP tool.

Panel values that are modified outside of the installation process are not saved in the DSNTIDxx data set and are not reflected on the panels.

### Update

This information identifies a corresponding field on the Update Selection Panel (DSNTIPB) or refers to information that provides instructions for updating the field value.

#### *dsnhdec*

These are the names of the parameters in the application defaults load module *dsnhdec*.

#### DSNZPxxx

These are the names of the parameters in the data-only load module DSNZPxxx.

#### Related concepts:

Application defaults parameters

#### Related reference:

DSNTIPB: Update selection menu panel

## Directory of subsystem parameters, panel fields, and application default values

Subsystem, installation panel fields, and application default values are settings that apply to an entire DB2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

The following table lists subsystem parameters and macro names, installation panel fields and panel names, and whether each parameter can be updated online. “Yes” in the Update online column means that the parameter can be updated online.

Table 34. Directory of subsystem parameters and application default values

Parameter name	Field name	Macro	Panel	Update online	DSNTIDxx entry or z/OSMF variable <sup>1</sup>
ABEXP	EXPLAIN PROCESSING	DSN6SPRM	DSNTIPO	Yes	ABEXP
ABIND	AUTO BIND	DSN6SPRM	DSNTIPO	Yes	ABIND
ACCELMODEL	—	DSN6SPRM	—	Yes	ACCELMODEL
ACCESS_CNTL_MODULE	ACCESS CONTROL	DSN6SYSP	DSNTIPO3		ACCTLMOD
ACCUMACC	DDF/RRSAF ACCUM	DSN6SYSP	DSNTIPN	Yes	ACCUMAC
ACCUMUID	AGGREGATION FIELDS	DSN6SYSP	DSNTIPN	Yes	ACCUMUID
ADMTPROC	ADMIN SCHEDULER	DSN6SPRM	DSNTIPX		ADMTPROC
AEXITLIM	AUTH EXIT LIMIT	DSN6SPRM	DSNTIPP	Yes	AEXITLIM

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
AGCCSID	ASCII CCSID	DSNHDECP	DSNTIPF		AGCCSID
ALCUNIT	ALLOCATION UNITS	DSN6ARVP	DSNTIPA	Yes	ALCUNIT
—	<i>dbname</i> ALL/	DSN6SPRM	DSNTIPS		—
AMCCSID	ASCII CCSID	DSNHDECP	DSNTIPF		AMCCSID
APPENSCH	APPLICATION ENCODING	DSNHDECP	DSNTIPF		APPENSCH
ARCPFX1	Archive logs: COPY 1 PREFIX	DSN6ARVP	DSNTIPH	Yes	ARCHPRE1
ARCPFX2	Archive logs: COPY 2 PREFIX	DSN6ARVP	DSNTIPH	Yes	ARCHPRE2
ARCRETN	RETENTION PERIOD	DSN6ARVP	DSNTIPA	Yes	ARCRETN
ARCWRTC	WTOR ROUTE CODE	DSN6ARVP	DSNTIPA	Yes	ARCHWRTC
ARCWTOR	WRITE TO OPER	DSN6ARVP	DSNTIPA	Yes	ARCHWTOR
ARC2FRST	READ COPY2 ARCHIVE	DSN6LOGP	DSNTIPO	Yes	ARC2FRST
ASCCSID	ASCII CCSID	DSNHDECP	DSNTIPF		ASCCSIDE
ASSIST	ASSISTANT	DSN6GRP	DSNTIPK		—
AUDITST	AUDIT TRACE	DSN6SYSP	DSNTIPN		AUDIT
AUTH	USE PROTECTION	DSN6SPRM	DSNTIPP		PROAUTH
AUTHCACH	PLAN AUTH CACHE	DSN6SPRM	DSNTIPP	Yes <sup>2</sup>	AUTHCACH
BACKODUR	BACKOUT DURATION	DSN6SYSP	DSNTIP11		BACKODUR
BIF_COMPATIBILITY	BIF COMPATIBILITY	DSN6SPRM	DSNTIPX	Yes	BIFCP
BINDNV	BIND NEW PACKAGE	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	BINDNV
BLKSIZE	BLOCK SIZE	DSN6ARVP	DSNTIPA	Yes	ARCHSIZE
BMPTOUT	IMS BMP TIMEOUT	DSN6SPRM	DSNTIPI	Yes	BMPTOUT
CACHE_DEP_TRACK_STOR_LIM	—	DSN6SPRM	—	Yes	CDTSL
CACHEDYN	CACHE DYNAMIC SQL	DSN6SPRM	DSNTIP8	Yes	CACHEDUM
CACHEDYN_FREELOCAL	—	DSN6SPRM	—	Yes	CACHFRE
CACHEPAC	PACKAGE AUTH CACHE	DSN6SPRM	DSNTIPP		CACHEPAC
CACHERAC	ROUTINE AUTH CACHE	DSN6SPRM	DSNTIPP		CACHERAC
CATALOG	CATALOG DATA	DSN6ARVP	DSNTIPA	Yes	ARCHCTLG
CATALOG	CATALOG ALIAS	DSN6SPRM	DSNTIPA2		VCATALOG
CATDDACL	DIRECTORY AND CATALOG DATA	DSN6SPRM	DSNTIPA2	Yes	CATDDACL
CATDMGCL	DIRECTORY AND CATALOG DATA	DSN6SPRM	DSNTIPA2	Yes	CATDMGCL
CATDSTCL	DIRECTORY AND CATALOG DATA	DSN6SPRM	DSNTIPA2	Yes	CATDSTCL
CATXDAACL	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	DSNTIPA2	Yes	CATXDAACL
CATXMGCL	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	DSNTIPA2	Yes	CATXMGCL
CATXSTCL	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	DSNTIPA2	Yes	CATXSTCL
CDSSRDEF	CURRENT DEGREE	DSN6SPRM	DSNTIP81 DSNTIP8	Yes	CDSSRDEF
CHECK_FASTREPLICATION	FAST REPLICATION	DSN6SPRM	DSNTIP6	Yes	CHKFASRP
CHECK_SETCHKP	SET CHECK PENDING	DSN6SPRM	DSNTIP61	Yes	CHKSCHKP



Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
CHGDC	DPROP SUPPORT	DSN6SPRM	DSNTIPO	Yes	CHGDC
CHKFREQ	CHECKPOINT FREQ	DSN6SYSP	DSNTIP11	Yes	CHKFREQ
CHKLOGR	RECORDS/CHECKPOINT	DSN6SYSP	DSNTIP11	Yes	CHKLOGR
CHKMINS	MINUTES/CHECKPOINT	DSN6SYSP	DSNTIP11	Yes	CKPTTIME
CHKTYPE	CHECKPOINT TYPE	DSN6SYSP	DSNTIP11	Yes	CHKTYPE
CMTSTAT	DDF THREADS	DSN6FAC	DSNTIPR		CMTSTAT
COMPACT	COMPACT DATA	DSN6ARVP	DSNTIPA	Yes	ARCHCOMP
COMPRESS_SPT01	COMPRESS SPT01	DSN6SPRM	DSNTIPA2	Yes	CMPSP01
CONDBAT	MAX REMOTE CONNECTED	DSN6SYSP	DSTIPE	Yes	CONDBAT
CONSTOR	CONTRACT THREAD STG	DSN6SPRM	DSNTIPE	Yes	CONSTOR
COORDNTR	COORDINATOR	DSN6GRP	DSNTIPK		—
CTHREAD	MAX USERS	DSN6SYSP	DSNTIPE	Yes	NUMCONCR
DBACRVW	DBADM CREATE AUTH	DSN6SPRM	DSNITPP1	Yes <sup>2</sup>	DBACRVW
DATE	DATE FORMAT	DSNHDECP	DSNTIP4		DEFDATE
DATELEN	LOCAL DATE LENGTH	DSNHDECP	DSNITP4		DEFDATEL
DB2SORT	UT DB2 SORT USE	DSN6SPRM	DSNTIP61	Yes	DB2SORT
DB2SUPLD	—	DSNHDECP	—		DB2SUPLD
DDF	DDF STARTUP OPTION	DSN6FAC	DSNTIPR		DDSTART
DDF_COMPATIBILITY	—	DSN6FAC	—	Yes	DDFCMPAT
DDLTOX	—	DSN6SPRM	—	Yes	DDLTOX
DEALCT	DEALLOC PERIOD	DSN6LOGP	DSNTIPA	Yes	ARCHDEAP
DECARTH	DECIMAL ARITHMETIC	DSNHDECP	DSNTIP4		DECARTH
DECDIV3	MINIMUM DIVIDE SCALE	DSN6SPRM	DSNTIP4		DECDIV3
DECIMAL	DECIMAL POINT IS	DSNHDECP	DSNTIPF		DECPOINT
DEF_DECFLOAT_ROUND_MODE	DECFLOAT ROUNDING MODE	DSNHDECP	DSNTIPF		DEFDFPRM
DEFLANG	LANGUAGE DEFAULT	DSNHDECP	DSNTIPF		DEFLANG
DEFLTID	UNKNOWN AUTHID	DSN6SPRM	DSNITPP1		PROTUNKN
DEL_CFSTRUCTS_ON_RESTART	DEL CF STRUCTS	DSN6SYSP	DSNTIPK		DCFS
DELIM	STRING DELIMITER	DSNHDECP	DSNTIPF		DEFSTRNG
DESCSTAT	DESCRIBE FOR STATIC	DSN6SPRM	DSNTIP4	Yes	DECSTAT
DISABLE_EDMRTS	—	DSN6SPRM	—	Yes	DEDR
DISABSCL	—	DSN6SPRM	—	Yes	—
DISALLOW_DEFAULT_COLLID	—	DSN6SPRM	—	Yes	—
DISALLOW_SEL_INTO_UNION	—	DSN6SPRM	—	Yes	—
DLDFREQ	LEVELID UPDATE FREQ	DSN6SYSP	DSNTIP11	Yes	DLDFREQ
DLITOUT	DL/I BATCH TIMEOUT	DSN6SPRM	DSNTIPI	Yes	DLITOUT
DPSEGSZ	DEFAULT PARTITION SEGSIZE	DSN6SYSP	DSNTIP7	Yes	DPSEGSZ
DSHARE	DATA SHARING	DSN6GRP	DSNTIPA1		DSHARE
DSMAX	DSMAX	DSN6SPRM	DSNTIPC	Yes	OPNDS
DSQLDELI	DIST SQL STR DELIMTR	DSNHDECP	DSNTIPF		DECPDSSD
DSSTIME	DATASET STATS TIME	DSN6SYSP	DSNTIPN	Yes	DSSTIME

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
DSVCI	VARY DS CONTROL INTERVAL	DSN6SYSP	DSNTIP7	Yes	DSVCI
DYNRULS	USE FOR DYNAMICRULES	DSNHDECP	DSNTIP4		DYNRULS
EDM_SKELETON_POOL	EDM SKELETON POOL SIZE	DSN6SPRM	DSNTIPC	Yes	EDMSKP
EDMDBDC	EDM DBD CACHE	DSN6SPRM	DSNTIPC	Yes	EDMDBDC
EDMPOOL	EDM LIMIT BELOW THE BAR	DSN6SPRM	DSNTIPC	Yes	EDMPOOL
EDMSTMTC	EDM STATEMENT CACHE	DSN6SPRM	DSNTIPC	Yes	EDMSTMTC
EDPROP	DPROP SUPPORT	DSN6SPRM	DSNTIPO	Yes	EDPROP
EN_PJSJ	—	DSN6SPRM	—	Yes	ENSHCEME
ENSCHHEME	DEF ENCODING SCHEME	DSNHDECP	DSNTIPF		ENPJSJ
EVALUNC	EVALUATE UNCOMMITTED	DSN6SPRM	DSNTIP8	Yes	EVALUNC
EXTRAREQ	bel	DSN6SYSP	DSNTIP5	Yes	EXTRAREQ
EXTRASRV	EXTRA BLOCKS SRV	DSN6SYSP	DSNTIP5	Yes	EXTRSRV
EXTSEC	EXTENDED SECURITY	DSN6SYSP	DSNTIPR	Yes <sup>2</sup>	EXTSEC
FCCOPYDDN	DEFAULT TEMPLATE	DSN6SPRM	DSNTIP6	Yes	FCCDTEMP
FLASHCOPY_COPY	COPY	DSN6SPRM	DSNTIP6	Yes	FCCP
FLASHCOPY_LOAD	LOAD	DSN6SPRM	DSNTIP6	Yes	FCLP
FLASHCOPY_PPRC	FLASHCOPY PPRC	DSN6SPRM	DSNTIP6	Yes	FCPPRC
FLASHCOPY_REBUILD_INDEX	REBUILD INDEX	DSN6SPRM	DSNTIP6	Yes	FCROT
FLASHCOPY_REORG_INDEX	REORG INDEX	DSN6SPRM	DSNTIP6	Yes	FCRBI
FLASHCOPY_REORG_TS	REORG TABLESPACE	DSN6SPRM	DSNTIP6	Yes	FCROI
GCCSID	EBCDIC CCSID	DSNHDECP	DSNTIPF		GCCSID
GRPNAME	GROUP NAME	DSN6GRP	DSNTIPK		GRPNAME
HONOR_KEEPPDICTIONARY	—	DSN6SPRM	—	Yes	HNRKPDIC
IDAUTH_MODULE	IDENTIFY/AUTH	DSN6SYSP	DSNTIP03		IDAUTMOD
IDBACK	MAX BATCH CONNECT	DSN6SYSP	DSNTIPE	Yes	NUMCONBT
IDFORE	MAX TSO CONNECT	DSN6SYSP	DSNTIPE	Yes	NUMCONTS
IDTHTOIN	IDLE THREAD TIMEOUT	DSN6FAC	DSNTIPR	Yes	IDTHTOIN
IDXBPOOL	DEFAULT BUFFER POOL FOR USER INDEXES	DSN6SYSP	DSNTIP1	Yes	IDXBPOOL
IGNSORTN	IGNORE SORTNUM STMT	DSN6SPRM	DSNTIP61	Yes	IGNSORTN
IMMEDWRI	IMMEDIATE WRITE	DSN6GRP	DSNTIP8	Yes	IMMEDWRI
IMPDSDEF	DEFINE DATA SETS	DSN6SYSP	DSNTIP7	Yes	IMPDSDEF
IMPDSIZE	—	DSN6SYSP	—	Yes	IMPDSIZE
IMPLICIT_TIMEZONE	IMPLICIT TIME ZONE	DSNHDECP	DSNTIP4		IMTZ
IMPTKMOD	—	DSN6SYSP	—	Yes	IMPTKMOD
IMPTSCMP	USE DATA COMPRESSION	DSN6SYSP	DSNTIP7	Yes	IMPTSCMP
INDEX_IO_PARALLELISM	—	DSN6SPRM	—	Yes	—
INLISTP	—	DSN6SPRM	—	Yes	INLISTP
IRLMAUT	AUTO START	DSN6SPRM	DSNTIPI		IRLMAUTO
IRLMPROC	PROC NAME	DSN6SPRM	DSNTIPI		IRLMPROC

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
IRLMRWT	RESOURCE TIMEOUT	DSN6SPRM	DSNTIPI		IRLMWAIT
IRLMSID	SUBSYSTEM NAME	DSN6SPRM	DSNTIPI		IRLMSSID
IRLMSWT	TIME TO AUTOSTART	DSN6SPRM	DSNTIPI	Yes	IRLMSTTO
IX_TB_PART_CONV_EXCLUDE		DSN6SPRM	—	Yes	XPKE
IXQTY	INDEX SPACE ALLOCATION	DSN6SYSP	DSNTIP7	Yes	IXQTY
LBACKOUT	LIMIT BACKOUT	DSN6SYSP	DSNTIP11		LBACKOUT
LC_TYPE	LOCALE LC_CTYPE	DSNHDECP	DSNTIPF		LCCTYPE
LEMAX	MAXIMUM LE TOKENS	DSN6SPRM	DSNTIPX		LEMAX
LOB_INLINE_LENGTH	LOB INLINE LENGTH	DSN6SYSP	DSNTIPD	Yes	LOBINLEN
LOBVALA	USER LOB VALUE STG	DSN6SYSP	DSNTIPD	Yes	LOBVALA
LOBVALS	SYSTEM LOB VAL STG	DSN6SYSP	DSNTIPD	Yes	LOBVALS
LRDRTHLD	LONG-RUNNING READER	DSN6SPRM	DSNTIPE	Yes	LRDRTHLD
MAINTYPE	CURRENT MAINT TYPES	DSN6SPRM	DSNTIP8	Yes	MAINTYPE
MATERIALIZE_NODET_SQLTUDF	—	DSN6SPRM	—	Yes	MNSU
MAX_CONCURRENT_PKG_OPS	—	DSN6SPRM	—	Yes	MXCONPKG
MAX_NUM_CUR	MAX OPEN CURSORS	DSN6SPRM	DSNTIPX	Yes	MXNUMCUR
MAX_ST_PROC	MAX STORED PROCS	DSN6SPRM	DSNTIPX	Yes	MXSTPROC
MAXARCH	RECORDING MAX	DSN6LOGP	DSNTIPA		ARCHMAXV
MAXCONQN		DSN6FAC	—	Yes	MAXCONQN
MAXCONQW	—	DSN6FAC	—	Yes	MAXCONQW
MAXDBAT	MAX REMOTE ACTIVE	DSN6SYSP	DSNTIPE	Yes	NUMCONRM
MAXKEEPD	MAX KEPT DYN STMTS	DSN6SPRM	DSNTIPE	Yes	MAXKEEPD
MAXOFILR	MAX OPEN FILE REFS	DSN6SYSP	DSNTIPE	Yes	MAXOFILR
MAXRBLK	RID POOL SIZE	DSN6SPRM	DSNTIPC	Yes	RIDPOOL
MAXRTU	READ TAPE UNITS	DSN6LOGP	DSNTIPA	Yes	ARCHMRTU
MAXTEMPS	MAX TEMP STG/AGENT	DSN6SPRM	DSNTIP9	Yes	MAXTEMPS
MAXTEMPS_RID	MAX TEMP RID	DSN6SPRM	DSNTIP9	Yes	MXTMPRID
MAXTYPE1	MAX INACTIVE DBATS	DSN6FAC	DSNTIPR	Yes	MAXTYPE1
MCCSID	EBCDIC CCSID	DSNHDECP	DSNTIPF		MCCSID
MEMBNAME	MEMBER NAME	DSN6GRP	DSNTIPK		MEMBNAME
MGEXTSZ	OPTIMIZE EXTENT SIZING	DSN6SYSP	DSNTIP7	Yes	MGEXTSZ
MINSTOR	MANAGE THREAD STORAGE	DSN6SPRM	DSNTIPE	Yes	MINSTOR
MIXED	MIXED DATA	DSNHDECP	DSNTIPF		DEFMIXED
MON	MONITOR TRACE	DSN6SYSP	DSNTIPN		MON
MONSIZE	MONITOR SIZE	DSN6SYSP	DSNTIPN		MONSIZE
MXDTCACH	MAX DATA CACHING	DSN6SPRM	DSNTIP8	Yes	MXDCACH
NEWFUN	—	DSNHDECP	—	No	NEWFUN
NPGTHRSH	—	DSN6SPRM	—	Yes	NPGTHRSH
NUMLKTS	LOCKS PER TABLE(SPACE)	DSN6SPRM	DSNTIPJ	Yes	IRLMLKTS
NUMLKUS	LOCKS PER USER	DSN6SPRM	DSNTIPJ	Yes	IRLMLKUS
OJPERFEH	—	DSN6SPRM	—		—

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
OPT1ROWBLOCKSORT	—	DSN6SPRM	—	Yes	OP1RBSRT
OPTHINTS	OPTIMIZATION HINTS	DSN6SPRM	DSNTIP8	Yes	OPTHINTS
OPTIOPIN	—	DSN6SPRM	—	Yes	—
OPTIOWGT	—	DSN6SPRM	—	Yes	—
OTC_LICENSE	OTC LICENSE USAGE	DSN6SYSP	DSNTIPO2		OTC_LICENSE
OUTBUFF	OUTPUT BUFFER	DSN6LOGP	DSNTIPL		OUTBUFF
PADIX	PAD INDEXES BY DEFAULT	DSN6SPRM	DSNTIP7	Yes	PADIX
PADNTSTR	PAD NUL-TERMINATED	DSNHDECP	DSNTIP4		PADNSTR
PARA_EFF	PARALLELISM EFFICIENCY	DSN6SPRM	DSNTIP8	Yes	PARAEFF
PARAMDEG	MAX DEGREE	DSN6SPRM	DSNTIP8	Yes	PARAMDEG
PCLOSEN	RO SWITCH CHKPTS	DSN6SYSP	DSNTIP11	Yes	PCLOSEN
PCLOSET	RO SWITCH TIME	DSN6SYSP	DSNTIP11	Yes	PKRC
PGRNGSCR	—	DSN6SPRM	—	Yes	—
PLANMGMT	PLAN MANAGEMENT	DSN6SPRM	DSNTIP8	Yes	PLANMGMT
PLANMGMTSCOPE	PLAN MANAGEMENT SCOPE	DSN6SPRM	DSNTIP8	Yes	PMSCOPE
POOLINAC	POOL THREAD TIMEOUT	DSN6FAC	DSNTIP5	Yes	POOLINAC
PRIQTY	PRIMARY QUANTITY	DSN6ARVP	DSNTIPA	Yes	ARCHPRI
PREVENT_NEW_IXCTRL_PART	—	DSN6SPRM	—	Yes	PCIP
PRIVATE_PROTOCOL	—	DSN6FAC	—	Yes	PRIVPRTL
PROTECT	ARCHIVE LOG RACF	DSN6ARVP	DSNTIPP	Yes	PROTARAC
PTASKROL	—	DSN6SYSP	—	Yes	PTASKROL
QUERY_ACCEL_OPTIONS	—	DSN6SPRM	DSNTIP82	Yes	QACO
QUERY_ACCELERATION	—	DSN6SPRM	—	Yes	QCAC
QUIESCE	QUIESCE PERIOD	DSN6ARVP	DSNTIPA	Yes	ARCHMQP
RANDOMATT	RANDOM ATTACH	DSN6GRP	DSNTIPK	Yes	RANDOMAT
REALSTORAGE_MANAGEMENT	—	DSN6SPRM	—	Yes	RSMGMT
REALSTORAGE_MAX	—	DSN6SPRM	—	Yes	RSMAX
REC_FASTREPLICATION	FAST RESTORE	DSN6SPRM	DSNTIP6	Yes	RECFASRP
RECALL	RECALL DATABASE	DSN6SPRM	DSNTIPO		RECALL
RECALLD	RECALL DELAY	DSN6SPRM	DSNTIPO	Yes	RECALLD
REFSHAGE	CURRENT REFRESH AGE	DSN6SPRM	DSNTIP8	Yes	REFSHAGE
REMOTE_COPY_SW_ACCEL	—	DSN6LOGP	—	Yes	RCSA
REORG_IGNORE_FREESPACE	—	DSN6SPRM	—	Yes	RIFS
REORG_LIST_PROCESSING	—	DSN6SPRM	—	Yes	RLPR
REORG_PART_SORT_NPSI	—	DSN6SPRM	DSNTIP62	Yes	RPSN
RESTART	RESTART OR DEFER	DSN6SPRM	DSNTIPS		RESTART
RESTORE_RECOVER_FROMDUMP	RESTORE/RECOVER	DSN6SPRM	DSNTIP6	Yes	RESRECFD
RESTORE_TAPEUNITS	MAXIMUM TAPE UNITS	DSN6SPRM	DSNTIP62 DSNTIP6	Yes	RESTORTU
RESTRICT_ALT_COL_FOR_DCC	—	DSN6SPRM	—	Yes	RACFD
RESYNC	RESYNC INTERVAL	DSN6FAC	DSNTIPR	Yes	RESYNC

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
RETLWAIT	RETAINED LOCK TIMEOUT	DSN6SPRM	DSNTIPI	Yes	RETLWAIT
RETRY_STOPPED_OBJECT	—	DSN6SPRM	—		RSO
RETVLCFK	—	DSN6SPRM	—	Yes	—
REVOKE_DEP_PRIVILEGES	REVOKE DEP PRIV	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	REVDPRIV
RGFCOLID	REGISTRATION OWNER	DSN6SPRM	DSNTIPZ		RGFCOLID
RGFDBNAM	REGISTRATION DATABASE	DSN6SPRM	DSNTIPZ		RGFDBNAM
RGFDEDPL	CONTROL ALL APPLICATIONS	DSN6SPRM	DSNTIPZ		RGFDEDPL
RGFDEFLT	UNREGISTERED DDL DEFAULT	DSN6SPRM	DSNTIPZ		RGFDEFLT
RGFESCP	ART/ORT ESCAPE CHARACTER	DSN6SPRM	DSNTIPZ		RGFESCP
RGFFULLQ	REQUIRE FULL NAMES	DSN6SPRM	DSNTIPZ		RGFFULLQ
RGFINSTL	INSTALL DD CONTROL SUPT	DSN6SPRM	DSNTIPZ		RGFINSTL
RGFNMORT	OBJT REGISTRATION TABLE	DSN6SPRM	DSNTIPZ		RGFNMORT
RGFNPRT	APPL REGISTRATION TABLE	DSN6SPRM	DSNTIPZ		RGFNPRT
RLF	RLF AUTO START	DSN6SYSP	DSNTIPO		RLFSTART
RLFAUTH	RESOURCE AUTHID	DSN6SYSP	DSNTIPP1	Yes	PROTRLF
RLFERR	RLST ACCESS ERROR	DSN6SYSP	DSNTIPO	Yes	RLFERROR
RLFERRD	RLST ACCESS ERROR	DSN6FAC	DSNTIPR	Yes	RLFERRD
RLFTBL	RLST NAME SUFFIX	DSN6SYSP	DSNTIPO	Yes	RLFSUFF
ROUTCDE	WTO ROUTE CODES	DSN6SYSP	DSNTIPO		OPROUTCD
RRF	REORDERED ROW FORMAT	DSN6SPRM	DSNTIP7	Yes	RRF
RRULOCK	U LOCK FOR RR/RS	DSN6SPRM	DSNTIPI	Yes	RRULOCK
SCCSID	EBCDIC CCSID	DSNHDECP	DSNTIPF		SCCSID
SECADM1	SECURITY ADMIN 1	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	SECADM1
SECADM1_INPUT_STYLE	—	DSN6SPRM	—	Yes	SECA1IS
SECADM1_TYPE	SEC ADMIN 1 TYPE	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	SECADM1T
SECADM2	SECURITY ADMIN 2	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	SECADM2
SECADM2_INPUT_STYLE	—	DSN6SPRM	—	Yes	SECA2IS
SECADM2_TYPE	SEC ADMIN 2 TYPE	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	SECADM2T
SECQTY	SECONDARY QTY	DSN6ARVP	DSNTIPA	Yes	ARCHSEC
SEPARATE_SECURITY	SEPARATE SECURITY	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	SEPSECUR
SEQCACH	—	DSN6SPRM	—	Yes	—
SEQPRES	—	DSN6SPRM	—	Yes	—
SIGNON_MODULE	SIGNON	DSN6SYSP	DSNTIPO3		SIGNON
SIMULATED_CPU_COUNT	—	DSN6SPRM	—	Yes	SIMCCNT
SIMULATED_CPU_SPEED	—	DSN6SPRM	—	Yes	SIMCSPD
SITETYP	SITE TYPE	DSN6SPRM	DSNTIPO		SITETYP
SJTABLES	—	DSN6SPRM	—	Yes	SJTABLES

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
SKIPUNCI	SKIP UNCOMM INSERTS	DSN6SPRM	DSNTIP8	Yes	SKIPUNCI
SMF89	—	DSN6SYSP	—	Yes	SMF89
SMFACCT	SMF ACCOUNTING	DSN6SYSP	DSNTIPN		OPSMFACT
SMFCOMP	COMPRESS SMF RECS	DSN6SYSP	DSNTIPN	Yes	SMFCOMP
SMFSTAT	SMF STATISTICS	DSN6SYSP	DSNTIPN		OPSMFSTA
SMSDCFL	—	DSN6SPRM	—	Yes	—
SMSDCIX	—	DSN6SPRM	—	Yes	—
SPT01_INLINE_LENGTH	SPT01 INLINE LENGTH	DSN6SPRM	DSNTIPA2	Yes <sup>3</sup>	SPT01INL
SQLDELI	SQL STRING DELIMITER	DSNHDECP	DSNTIPF		DEFSQSTR
SQWIDSC	—	DSN6SPRM	—	Yes	SQWIDSC
SRTPOOL	SORT POOL SIZE	DSN6SPRM	DSNTIPC	Yes	SRTPOOL
SSID	SUBSYSTEM NAME	DSNHDECP	DSNTIPM		MVSSNAME
STARJOIN	STAR JOIN QUERIES	DSN6SPRM	DSNTIP8	Yes	STARJOIN
STATCLUS	—	DSN6SPRM	—	Yes	—
STATHIST	STATISTICS HISTORY	DSN6SPRM	DSNTIP6 DSNTIP61	Yes	STATHIST
STATIME	STATISTICS TIME	DSN6SYSP	DSNTIPN	Yes	OPSTATIM
STATROLL	STATISTICS ROLLUP	DSN6SPRM	DSNTIP61	Yes	STATROLL
STATSINT	REAL TIME STATS	DSN6SPRM	DSNTIPO	Yes	STATSINT
STDSQL	STD SQL LANGUAGE	DSNHDECP	DSNTIP4		DEFSQLVL
STORMXAB	MAX ABEND COUNT	DSN6SYSP	DSNTIPX	Yes	STORMXAB
STORTIME	TIMEOUT VALUE	DSN6SYSP	DSNTIPX	Yes	STORTIME
SUBQ_MIDX	—	DSN6SPRM	—	Yes	SUBQ_MIDX
SUPERRS	SUPPRESS SOFT ERRORS	DSN6SPRM	DSNTIPM	Yes	SUPERRS
SUPPRESS_HINT_SQLCODE_DYN	—	DSN6SPRM	—	Yes	SHSD
SVOLARC	SINGLE VOLUME	DSN6ARVP	DSNTIPA	Yes	SVOLARC
SYNCVAL	STATISTICS SYNC	DSN6SYSP	DSNTIPN	Yes	SYNCVAL
SYSADM	SYSTEM ADMIN 1	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	PROTADMN
SYSADM2	SYSTEM ADMIN 2	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	PROTADM2
SYSOPR1	SYSTEM OPERATOR 1	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	PROTOPR1
SYSOPR2	SYSTEM OPERATOR 2	DSN6SPRM	DSNTIPP1	Yes <sup>2</sup>	PROTOPR2
SYSTEM_LEVEL_BACKUPS	SYSTEM-LEVEL BACKUPS	DSN6SPRM	DSNTIP62 DSNTIP6	Yes	SYSLVLBK
TBSBP8K	DEFAULT 8-KB BUFFER POOL FOR USER DATA	DSN6SYSP	DSNTIP1	Yes	TBSBP8K
TBSBP16K	DEFAULT 16-KB BUFFER POOL FOR USER DATA	DSN6SYSP	DSNTIP1	Yes	TBSBP16K
TBSBP32K	DEFAULT 32-KB BUFFER POOL FOR USER DATA	DSN6SYSP	DSNTIP1	Yes	TBSBP32K
TBSBPLOB	DEFAULT BUFFER POOL FOR USER LOB DATA	DSN6SYSP	DSNTIP1	Yes	TBSBPLOB
TBSBPOOL	DEFAULT 4-KB BUFFER POOL FOR USER DATA	DSN6SYSP	DSNTIP1	Yes	TBSBPOOL
TBSBPXML	DEFAULT BUFFER POOL FOR USER XML DATA	DSN6SYSP	DSNTIP1	Yes	TBSBPXML

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
TCPALVER	TCP/IP ALREADY VERIFIED	DSN6FAC	DSNTIP5	Yes	TCPALVER
TCPKPALV	TCP/IP KEEPALIVE	DSN6FAC	DSNTIP5	Yes <sup>2</sup>	TCPKPALV
TEMPLATE_TIME	—	DSN6SPRM	—	Yes	TPTM
TIME	TIME FORMAT	DSNHDECP	DSNTIP4		DEFTIME
TIMELN	LOCAL TIME LENGTH	DSNHDECP	DSNTIP4		DEFTIMEL
TRACSTR	TRACE AUTO START	DSN6SYSP	DSNTIPN		OPTRCAUT
TRACTBL	TRACE SIZE	DSN6SYSP	DSNTIPN		CALC/ OPTRCSIZ
TRKRSITE	TRACKER SITE	DSN6SPRM	DSNTIPO		TRKRSITE
TSQTY	TABLE SPACE ALLOCATION	DSN6SYSP	DSNTIP7	Yes	TSQTY
TSTAMP	TIMESTAMP ARCHIVES	DSN6ARVP	DSNTIPH	Yes	ARCHTS
TWOACTV	NUMBER OF COPIES	DSN6LOGP	DSNTIPH		CALC/ LOGSTWO
TWOARCH	NUMBER OF COPIES	DSN6LOGP	DSNTIPH		CALC/ ARCHTWO
TWOBSDS	—	DSN6LOGP	—		TWOBSDS
UGCCSID	UNICODE CCSID	DSNHDECP	DSNTIPF		UGCCSID
UIFCIDS	UNICODE IFCIDS	DSN6SYSP	DSNTIPN	Yes	UIFCIDS
UMCCSID	UNICODE CCSID	DSNHDECP	DSNTIPF		UMCCSID
UNION_COLNAME_7	—	DSN6SPRM	—	Yes	UNCOLN7
UNIT	DEVICE TYPE 1	DSN6ARVP	DSNTIPA	Yes	ARCHDEVT
UNIT2	DEVICE TYPE 2	DSN6ARVP	DSNTIPA	Yes	ARCHDEV2
URCHKTH	UR CHECK FREQ	DSN6SYSP	DSNTIP11	Yes	URCHKTH
URLGWTH	UR LOG WRITE CHECK	DSN6SYSP	DSNTIP11	Yes	URLGWTH
USCCSID	UNICODE CCSID	DSNHDECP	DSNTIPF		USCCSID
UTIL_TEMP_STORCLAS	UTIL TEMP STORCLAS	DSN6SPRM	DSNTIP61	Yes	UTTEMPSC
UTILS_DUMP_CLASS_NAME	DUMP CLASS NAME	DSN6SPRM	DSNTIP62 DSNTIP61	Yes	UTDUMPCL
UTIMOUT	UTILITY TIMEOUT	DSN6SPRM	DSNTIP6 DSNTP61	Yes	UTIMOUT
UTSORTAL	UT SORT DATA SET ALLOCATION	DSN6SPRM	DSNTIP61	Yes	UTSORTAL
VOLTDEVT	TEMP DS UNIT NAME	DSN6SPRM	DSNTIP61	Yes	VOLTDEVT
WFDBSEP	SEPARATE WORK FILES	DSN6SPRM	DSNTIP9		WFDBSEP
WLMENV	WLM ENVIRONMENT	DSN6SYSP	DSNTIPX	Yes	WLMENV
XLKUPDLT	X LOCK FOR SEARCHED U/D	DSN6SPRM	DSNTIPI	Yes	XLKUPDLT
XMLVALA	USER XML VALUE STG	DSN6SYSP	DSNTIPD	Yes	XMLVALA
XMLVALS	SYSTEM XML VALUE STG	DSN6SYSP	DSNTIPD	Yes	XMLVALS
XML_RANDOMIZE_DOCID	RANDOMIZE XML DOCID	DSN6SYSP	DSNTIP8	Yes	XRDI
XML_RESTRICT_EMPTY_TAG	—	DSN6SPRM	—	Yes	NOET
ZOSMETRICS	—	DSN6SPRM	—	Yes	ZOSMETRI

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
—	ADVANCED CONFIGURATION OPTIONS	—	DSNTIPR1	—	—
—	APPL DEFAULTS	—	DSNTIPO3	—	—
—	APPLICATION DBRM	—	DSNTIPT	—	DBRMLIB
—	APPLICATION LOAD	—	DSNTIPT	—	RUNLIB
—	ARCHIVE LOG FREQ	—	DSNTIPL	—	NUMHRARC
—	AUTH MEMBER	—	DSNTIPM	—	MVSAMEMB
—	AUTH SEQUENCE	—	DSNTIPM	—	MVSASEQN
—	BP0 - BP29	—	DSNTIP1	—	BP0 - BP29
—	BP30 - BP32K9	—	DSNTIP2	—	BP30 - BP32K9
—	BUFFER POOL SIZE	—	DSNTIPC	—	—
—	CICS and IMS transaction invocation routines	—	DSNTIPRA	—	—
—	CICS COBOL LIBRARY	—	DSNTIPW	—	CICSCOB
—	CICS EXCI LIBRARY	—	DSNTIPW	—	CICSEXCI
—	CICS LOAD LIBRARY	—	DSNTIPW	—	CICSMOD
—	CICS MACRO LIBRARY	—	DSNTIPW	—	CICSMAC
—	CICS PL/I LIBRARY	—	DSNTIPW	—	CICSPLI
—	C/CPP COMPILER LIBRARY>	—	DSNTIPU	—	CCOMP
—	C/CPP COMPILER MODULE	—	DSNTIPU	—	CPROG
—	C/CPP HEADER LIBRARY	—	DSNTIPU	—	CHDRS
—	C/370™ COMPILER MESSAGES	—	DSNTIPU	—	CMSGS
—	CPP AUTO CALL LIBRARY	—	DSNTIPU	—	CPPAUTCL
—	CPP CLASS LIB HEADERS	—	DSNTIPU	—	CPPHDRS
—	CPP CLASS LIBRARY	—	DSNTIPU	—	CPPCLASS
—	CPP PROCEDURE LIBRARY	—	DSNTIPU	—	CPPPROC
—	CLIST ALLOCATION	—	DSNTIPA2	—	VOLSDAT1
—	CLIST LIBRARY	—	DSNTIPT	—	OUTCL
—	COBOL COMPILER LIBRARY	—	—	—	ICOBCOMP
—	COBOL LE PRELINKER PHASE	—	—	—	ICOBPRLK
—	COLUMNS	—	DSNTIPD	—	—
—	COMMAND PREFIX	—	DSNTIPM	—	MVSSPREF
—	COMMAND SCOPE	—	DSNTIPM	—	MVSCMSC
—	COPY 1 NAME	—	DSNTIPH	—	BSDSNAM1
—	COPY 2 NAME	—	DSNTIPH	—	BSDSNAM2
—	Active logs: COPY 1 PREFIX	—	DSNTIPH	—	LOGSPRE1
—	Active logs: COPY 2 PREFIX	—	DSNTIPH	—	LOGSPRE2
—	DATA SET NAME PREFIX	—	DSNTIPA1	—	DSNILIBP
—	DATA SET NAME SUFFIX	—	DSNTIPA1	—	DSNILIBS



Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
—	DATABASES	—	DSNTIPD		—
—	Database metadata routines	—	DSNTIPRA		—
—	DATABASES	—	DSNTIPE		—
—	DBRM LIBRARY	—	DSNTIPT		DSNDBRM
—	DB2 administrator routines	—	DSNTIPRA		—
—	DB2 GENERIC LUNAME	—	DSNTIPR		GENLUNM
—	DB2 LOCATION NAME	—	DSNTIPR		DDLOC
—	DB2 NETWORK LUNAME	—	DSNTIPR		DDLUNAM
—	DB2 NETWORK PASSWORD	—	DSNTIPR		DDPASS
—	optimization routines	—	DSNTIPRA		—
—	security routines on	—	DSNTIPRA		—
—	DEADLOCK CYCLE	—	DSNTIPJ		—
—	DEADLOCK TIME	—	DSNTIPJ		—
—	DECLARATION LIBRARY	—	DSNTIPA3		SRCLIB
—	DEFINE CATALOG	—	DSNTIPA2		—
—	DISCONNECT IRLM	—	DSNTIPJ		IRLMDISC
—	DRDA PORT	—	DSNTIP5		DRDAPRT
—	Enter job card information for install and sample jobs	—	DSBNTIPY		—
—	EXECUTED STMTS	—	DSNTIPD		NUMSTMTE
—	EXIT LIBRARY	—	DSNTIPT		DSNEXIT
—	FORTRAN COMPILER LIBRARY	—	DSNTIPU		FORTCOMP
—	FORTRAN LINK EDIT LIB	—	DSNTIPU		FORTLINK
—	FOR DB2 REXX ROUTINES	—	DSNTIPR1		WLMENVR
—	FOR DB2 UTILITIES ROUTINES	—	DSNTIPR1		WLMENVU
—	FOR DB2 XML PROCESSING ROUTINES	—	DSNTIPR1		WLMENVX
—	FOR MOST DB2 ROUTINES	—	DSNTIPR1		WLMENVG
—	FOR MOST DB2 JAVA ROUTINES	—	DSNTIPR1		WLMENVJ
—	FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL	—	DSNTIPR1		WLMENVP
—	FOR SERIALIZED ROUTINES	—	DSNTIPR1		WLMENV1
—	FOR THE DB2 CICS ROUTINE	—	DSNTIPR1		WLMENVC
—	FOR DB2 MQSERIES ROUTINES	—	DSNTIPR1		WLMENVM
—	FOR DB2 WEB SERVICES ROUTINES	—	DSNTIPR1		WLMENVW
—	FOR UNIFIED DEBUGGER ROUTINES	—	DSNTIPR1		WLMENV D
—	FROM RELEASE	—	DSNTIPA1		WLMENV D

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
—	GDDM LOAD MODULES	—	DSNTIPW		GDDMLOAD
—	GDDM MACLIB	—	DSNTIPW		GDDMMACS
—	GRANT EXECUTE (on many sub-panels)	—	DSNTIPRA		—
—	GROUP ATTACH	—	DSNTIPK		GRPATTNM
—	HIGH LEVEL ASSEMBLER LIB	—	DSNTIPU		ASMLIB
—	IBM LE LINK EDIT LIB	—	DSNTIPU		LELKED
—	IBM LE PRELINK MSG LIB	—	DSNTIPU		LEPLMSG
—	IBM LE RUNTIME LIBRARY	—	DSNTIPU		LERUN
—	IBM Text Search routines	—	DSNTIPRA		—
—	IMS RESLIB	—	DSNTIPW		RESLIB
—	INCLUDE LIBRARY	—	DSNTIPT		DSNCHDRS
—	INPUT MEMBER NAME	—	DSNTIPA1		—
—	INSTALL TYPE	—	DSNTIPA1		INSTYPE
—	IRLM LOAD LIBRARY	—	DSNTIPT		DSNIRLM
—	IRLM XCF GROUP NAME	—	DSNTIPJ		IRLMGRPN
—	ISPF ISPLINK MODULE	—	DSNTIPW		ISPLOAD
—	IVP DATA LIBRARY	—	DSNTIPT		DSNIVPD
—	Java and SQL procedure processing routines	—	DSNTIPRA		—
—	JSON routines	—	DSNTIPRA		—
—	LIBRARY NAME PREFIX	—	DSNTIPA1		DSNTLIBP
—	LIBRARY NAME SUFFIX	—	DSNTIPA1		DSNTLIBS
—	LICENSE TERMS ACCEPTED	—	DSNTIPO2		—
—	LINK LIST ENTRY	—	DSNTIPM		MVSLMEMB
—	LINK LIST LIBRARY	—	DSNTIPA3		DSNLINK
—	LINK LIST SEQUENCE	—	DSNTIPM		MVSLSEQN
—	LOAD LIBRARY	—	DSNTIPA3		DSNLOAD
—	LOAD DISTRIBUTION	—	DSNTIPT		DSNALOAD
—	LOCK ENTRY SIZE	—	DSNTIPJ		IRLMKLSZ
—	LOG COPY 1, BSDS 2	—	DSNTIPA3		VOLSDAT6 DATACLS6 MGMTCLS6 STORCLS6
—	LOG COPY 2, BSDS 1	—	DSNTIPA3		VOLSDAT7 DATACLS7 MGMTCLS7 STORCLS7
—	MEMBER IDENTIFIER	—	DSNTIPJ		IRLMIDEN
—	NON-VSAM DATA	—	DSNTIPA3		VOLSDAT2 DATACLS2 MGMTCLS2 STORCLS2
—	MACRO LIBRARY	—	DSNTIPT		DSNMACS

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
—	MAX STORAGE FOR LOCKS	—	DSNTIPJ	—	—
—	MQseries routines	—	DSNTIPRA	—	—
—	NUMBER OF LOCK ENTRIES	—	DSNTIPJ	—	IRLMLTE
—	NUMBER OF LOGS	—	DSNTIPL	—	LOGSNUM
—	NUMBER OF TCBS	—	DSNTIPX	—	STORTCBS
—	OTC LICENSE USAGE	—	DSNTIPO1	—	—
—	OUTPUT MEMBER NAME	—	DSNTIPA1	—	—
—	PACKAGE LISTS	—	DSNTIPD	—	—
—	GRANT OWNER (on many sub-panels)	—	DSNTIPRA	—	—
—	PACKAGE STATEMENTS	—	DSNTIPD	—	—
—	PACKAGES	—	DSNTIPD	—	—
—	PAGE PROTECT	—	DSNTIPJ	—	IRLMPGPR
—	PARAMETER MODULE	—	DSNTIPO3	—	DSNZPARM
—	PERMANENT UNIT NAME	—	DSNTIPA3	—	VOLSDEVT
—	PLAN STATEMENTS	—	DSNTIPD	—	—
—	PLANS	—	DSNTIPD	—	—
—	PL/I COMPILER LIBRARY	—	—	—	PLICOMP
—	REMOTE LOCATION	—	DSNTIPY	—	—
—	RESYNC PORT	—	DSNTIP5	—	RESYNPRT
—	Runtime statistics processing routines	—	DSNTIPRA	—	—
—	SAMPLE LIBRARY	—	DSNTIPT	—	NEWSAMP
—	SECURE PORT	—	DSNTIP5	—	SECPORT
—	START IRLM CTRACE	—	DSNTIPJ	—	—
—	SORT LIBRARY	—	DSNTIPW	—	SORTLIB
—	SUBGRP ATTACH	—	DSNTIPK	—	SGRPATNM
—	SUBSYSTEM MEMBER	—	DSNTIPM	—	MVSSMEMB
—	SUBSYSTEM SEQUENCE	—	DSNTIPM	—	MVSSSEQN
—	SYSTEM MACLIB	—	DSNTIPW	—	MACLIB
—	SYSTEM PROCEDURES	—	DSNTIPW	—	—
—	TABLES	—	DSNTIPD	—	—
—	TABLES IN STMT	—	DSNTIPD	—	—
—	TABLESPACES	—	DSNTIPD	—	—
—	TEMP CLIST LIBRARY	—	DSNTIPT	—	—
—	TEMPORARY UNIT NAME	—	DSNTIPA3	—	TVOLDEVT
—	Trace formatting routines	—	DSNTIPRA	—	—
—	UPDATE RATE	—	DSNTIP1	—	NUMCOMHR
—	Unified debugger for Java and SQL routines	—	DSNTIPRA	—	—
—	Utility invocation routines	—	DSNTIPRA	—	—

Table 34. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DSNTID <sub>xx</sub> entry or z/OSMF variable <sup>1</sup>
—	VSAM CATALOG, DEFAULT AND WORK FILE DATABASE	—	DSNTIPA3		VOLSDAT3 DATACLS3 MGMTCLS3 STORCLS3
—	VIEWS	—	DSNTIPD		—
—	Web services/SOAP routines	—	DSNTIPRA		—
—	WLM ENV NAME (on many sub-panels)	—	DSNTIPRA		—
—	WLM PROC NAME	—	DSNTIPX		STORWLM
—	WORK FILE DB	—	DSNTIPK		WKDBNAME
—	XML schema processing routines	—	DSNTIPRA		—
—	4K SORT PRIMARY SPACE	—	DSNTIP9		S4KSPAC
—	4K SORT WORK TS'S	—	DSNTIP9		S4KNOTS
—	4K SORT WORK SEG SIZE	—	DSNTIP9		S4KSGSZ
—	4K TEMP PRIMARY SPACE	—	DSNTIP9		T4KSPAC
—	4K TEMP WORK TS'S	—	DSNTIP9		T4KNOTS
—	4K TEMP WORK SEG SIZE	—	DSNTIP9		T4KSGSZ
—	32K SORT PRIMARY SPACE	—	DSNTIP9		S32KSPAC
—	32K SORT WORK TS'S	—	DSNTIP9		S32KNOTS
—	32K SORT WORK SEG SIZE	—	DSNTIP9		S32KSGSZ
—	32K TEMP PRIMARY SPACE	—	DSNTIP9		T32KSPAC
—	32K TEMP WORK TS'S	—	DSNTIP9		T32KNOTS
—	32K TEMP WORK SEG SIZE	—	DSNTIP9		T32KSGSZ

**Notes:**

1. For use when installing or migrating to DB2 11 or later by using z/OSMF workflows only. These variable names are not used for migrations to DB2 10 or new DB2 10 installations. For more information, see Installing or migrating DB2 with z/OS Management Facility.
2. You must use a privilege set of the process that includes installation SYSADM authority or SECADM authority to update this parameter.
3. This subsystem parameter can only be changed online. Restarting DB2 has no effect on the setting.

**Related concepts:**

The scope and uniqueness of DB2 subsystem parameters in data sharing


## Subsystem parameters that are not on installation panels

Some subsystem parameters are defined by job DSNTIJUZ and are not associated with fields on any installation panels.

**Related tasks:**

Installation step 5: Define DB2 initialization parameters: DSNTIJUZ

**Related reference:**

 Defining data classes (DFSMS Implementing System-Managed Storage: Optimizing Tape Usage)

## **ACCEL in macro DSN6SPRM**

Specifies whether accelerator servers can be used with a DB2 subsystem, and how the accelerator servers are to be enabled and started. An accelerator server cannot be started unless it is enabled.

Acceptable values:	NO, AUTO, COMMAND
Default:	NO
DSNZPxxx:	DSN6SPRM.ACCEL

**NO** Specifies that accelerator servers cannot be used with the DB2 subsystem.

**AUTO**

Specifies that accelerator servers are automatically enabled and started when the DB2 subsystem is started.

**COMMAND**

Specifies that accelerator servers are automatically enabled when the DB2 subsystem is started. The accelerator servers can be started with the DB2 START ACCEL command.

**Related information:**

## **ACCELMODEL in macro DSN6SPRM**

Specifies whether to enable the modeling of query workloads for evaluating the potential savings for both accumulated elapsed time and processor time if the plan is run on an accelerator server.

Only queries that DB2 deems eligible to run on an accelerator server are included in the accelerator-related fields of accounting trace IFCID 3.

**NO** Specifies that modeling is not done. NO is the default.

**YES** Specifies that modeling is done. The YES value applies only when the following requirements are also met:

- The value of the QUERY ACCELARATION subsystem parameter value is NONE, ENABLE, ENABLE WITH FAILBACK or ELIGIBLE.
- The CURRENT GET\_ACCEL\_ARCHIVE special register value is NO.
- The GET\_ACCEL\_ARCHIVE subsystem parameter value is NO

If other values are specified, DB2 tries to accelerate queries instead of doing accelerator modeling.

**Related tasks:**

 Determining whether queries can benefit from acceleration (DB2 Performance)

**Related reference:**

QUERY\_ACCELERATION in macro DSN6SPRM

 CURRENT GET\_ACCEL\_ARCHIVE (DB2 SQL)

## CACHE\_DEP\_TRACK\_STOR\_LIM in macro DSN6SPRM

Specifies the amount of storage in gigabytes that DB2 allocates for hashing entries in the dynamic statement cache.

The value must be an integer between 2 and 10. The default value is 2.

## CACHEDYN\_FREELOCAL in macro DSN6SPRM

Indicates whether DB2 can free cached dynamic statements to relieve DBM1 below-the-bar storage. CACHEDYN\_FREELOCAL applies only when the KEEP DYNAMIC(YES) bind option is active.

If you specify 0, DB2 does not free cached dynamic statements to relieve high use of storage by dynamic SQL caching.

The default value is 1, which means that DB2 frees some cached dynamic statements to relieve high use of storage when the cached SQL statement pools have grown to a certain size.

## DDF\_COMPATIBILITY in macro DSN6FAC

Controls certain characteristics of a connection between a client application and a DB2 for z/OS data server.

Values can be specified in any combination and in any order. If more than one value is specified, the values must be separated by commas, and the entire set of values must be enclosed in parentheses. For example, any of the following specifications are valid:

```
DDF_COMPATIBILITY=DISABLE_IMPCAST_NJV  
DDF_COMPATIBILITY=IGNORE_TZ  
DDF_COMPATIBILITY=(SP_PARMS_NJV,SP_PARMS_JV)  
DDF_COMPATIBILITY=(DISABLE_IMPCAST_NJV,DISABLE_IMPCAST_JV)  
DDF_COMPATIBILITY=(DISABLE_IMPCAST_NJV,SP_PARMS_NJV,DISABLE_IMPCAST_JV)
```

You can specify the following values for DDF\_COMPATIBILITY:

### **null**

The DDF\_COMPATIBILITY parameter has no effect and DB2 10 new function behavior is used for all applications.

### **DISABLE\_ITTO\_EXCPTN**

Specifies that the DB2 for z/OS server does not send serviceability information to clients for idle thread timeout conditions.

DISABLE\_ITTO\_EXCPTN is deprecated.

### **DISABLE\_IMPCAST\_JV**

Specifies that the DB2 for z/OS server disables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types, when the application is a Java client application that uses the IBM Data Server Driver for JDBC and SQLJ.

If DISABLE\_IMPCAST\_JV is not specified, DB2 enables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types.

DB2 uses DISABLE\_IMPCAST\_JV only in DB2 10 new-function mode. In DB2 10 conversion mode, DB2 does not do implicit casting.

#### **DISABLE\_IMPCAST\_NJV**

Specifies that the DB2 for z/OS disables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types, when the application is a non-Java client application that uses an IBM Data Server client or driver that is at Version 10.5 or earlier.

If DISABLE\_IMPCAST\_NJV is not specified, DB2 enables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types.

DB2 uses DISABLE\_IMPCAST\_NJV only if DB2 is in DB2 10 new-function mode. If DB2 is in DB2 10 conversion mode, DB2 does not do implicit casting.

#### **IDNTFY\_V10\_PRIOR\_VER**

Specifies that a DB2 for z/OS server in DB2 10 conversion mode identifies itself to all remote clients as one of the following servers:

- A DB2 for z/OS server in DB2 9 new-function mode, if migration was from DB2 9
- A DB2 for z/OS server in Version 8 in new-function mode, if migration was from Version 8

#### **IGNORE\_TZ**

Specifies that the time zone information is ignored in the boundary error checking for `TIMESTAMP WITH TIME ZONE` input variables when the target data type is `TIMESTAMP` and the client driver is IBM Data Server Driver for JDBC and SQLJ.

IGNORE\_TZ is deprecated.

#### **SP\_PARMS\_JV**

Specifies that when a Java client application calls a DB2 for z/OS stored procedure, DB2 returns output argument values with data types that match the data types that were specified in the `CallableStatement.registerOutParameter` method calls.

If SP\_PARMS\_JV is not specified, DB2 returns output parameter values with data types that match the data types of the parameters in the stored procedure definition.

SP\_PARMS\_JV is deprecated.

#### **SP\_PARMS\_NJV**

Specifies that when a non-Java client application calls a DB2 for z/OS stored procedure, DB2 returns output argument values with data types that match the data types of the corresponding `CALL` statement arguments.

**Exception:** DB2 does not return output argument values with data types that match the data types of the corresponding `CALL` statement arguments if either of the following conditions is true:

- The non-Java client is Version 10 or later.
- The stored procedure uses a parameter data type that was introduced in DB2 10 (`XML`, `TIMESTAMP WITH TIMEZONE`, or `TIMESTAMP` with precision greater than 6).

If either condition is true, DB2 returns output parameter values with data types that match the data types of the parameters in the stored procedure definition.

If SP\_PARMS\_NJV is not specified, DB2 returns output parameter values with data types that match the data types of the parameters in the stored procedure definition.

SP\_PARMS\_NJV is deprecated.

## DDLTOX in macro DSN6SPRM

The DDLTOX subsystem parameter specifies how long a request for SQL data definition is to wait for a resource before timing out. This parameter is used for the processing of DDL statements and GRANT, REVOKE, and LOCK statements.

Acceptable values:	1 - 254
Default:	1
DSNZPxxx:	DSN6SPRM DDLTOX

**1 - 254** The actual timeout value is the product of the value of this subsystem parameter and the value of the IRLMRWT subsystem parameter. The default value of 1 means that the value of the IRLMRWT subsystem parameter is used as the timeout value.

### Related reference:

RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)

## DISABLE\_EDMRTS in macro DSN6SPRM

The DISABLE\_EDMRTS subsystem parameter specifies whether to disable the collection of real-time statistics by the environmental description manager (EDM). By default, EDM collects real-time statistics to track when packages were last used.

Acceptable values:	NO, YES
Default:	NO
DSNZPxxx:	DSN6SPRM DISABLE_EDMRTS

**NO** EDM continues to collect real-time statistics about the last use of packages. This is the recommended value.

**YES** EDM does not collect real-time statistics about the last use of packages. YES might be appropriate in the following situations:

- You have no need to collect information about the last use of packages.
- The SYSIBM.SYSPACKAGE table is persistently unavailable, which prevents the recording of EDM real-time statistics.
- Deferred externalization of these statistics to the SYSIBM.SYSPACKAGE table causes excessive DB2 shutdown time.
- Collection of these EDM statistics causes performance degradation.

In a data sharing environment, all members should use the same setting for this parameter.

## DISABSCL in macro DSN6SPRM

Specifies whether SQLWARN1 and SQLWARN5 are set for non-scrollable cursors on OPEN and ALLOCATE CURSOR.

The default value is NO, which means that SQLWARN1 and SQLWARN5 are set.

This subsystem parameter is deprecated in DB2 10.



## DISALLOW\_DEFAULT\_COLLID in macro DSN6SPRM

Specifies whether the default collection ID, `DSN_DEFAULT_COLLID_plan-name`, is used for implicitly generated packages during the automatic DBRM to package conversion process.

Valid values are YES and NO.

A value of YES has the following implications:

- The BIND PLAN command cannot be used with the MEMBER option. When this setting is used, any attempt to use the BIND PLAN command with the MEMBER option fails.
- The REBIND PLAN command cannot be used without the COLLID option or COLLID (\*) specified if the plan has directly bound DBRMs. When this setting is in effect, use the COLLID option to specify a collection ID for the directly bound DBRMs.
- Automatic rebinds do not convert existing plans that were last bound from DBRMs; such attempts fail with a negative SQLCODE.

A value of NO has the following implications:

- The BIND PLAN command is not restricted from honoring the use of the MEMBER option. When this setting is used and a BIND PLAN statement contains the MEMBER option, DB2 first binds the specified DBRM as a package in a collection ID that is named `DSN_DEFAULT_COLLID_plan-name`. DB2 then binds the plan (*plan-name*) from that collection ID.
- The REBIND PLAN command can be used with or without the COLLID option or COLLID(\*) specified. When this setting is used and the plan has directly bound DBRMs, DB2 first binds the DBRM as a package in a collection ID that is named `DSN_DEFAULT_COLLID_plan-name`. DB2 then rebinds the plan (*plan-name*) from that collection ID.
- Automatic rebinds can convert existing plans that were bound from DBRMs into packages from which those plans are then rebound. When an automatic rebind of a plan occurs and that plan was bound directly from a DBRM, DB2 first converts the plan into a package in a collection ID that is named `DSN_DEFAULT_COLLID_plan-name`. DB2 then rebinds the plan (*plan-name*) from that collection ID.

The default value of `DISALLOW_DEFAULT_COLLID` is NO.

## DISALLOW\_SEL\_INTO\_UNION in macro DSN6SPRM

Specifies whether to disallow a UNION or UNION ALL as the outermost from-clause of a SELECT INTO statement, which is invalid SQL syntax. Such statements were inadvertently allowed before DB2 12. However, starting in DB2 12 they are disallowed by default.

Acceptable values:	YES, NO
Default:	NO
Online changeable:	YES
DSNZPxxx:	DSN6SPRM DISALLOW_SEL_INTO_UNION

**Important:** The `DISALLOW_SEL_INTO_UNION` is deprecated. That is, it remains supported, but support is likely to be removed eventually. Identify any packages that use UNION or UNION ALL in the from-clause of a SELECT INTO statement and correct them as necessary.

You can identify affected packages while `DISALLOW_SEL_INTO_UNION` is set to `NO` by binding suspected packages into a dummy collection ID with `EXPLAIN(ONLY)` and monitoring IFCID 0376 records. Use the following procedure:

1. Issue the following SQL statement to generate a list of `BIND` commands.

```
SELECT 'BIND PACKAGE(DUMMYCOL) COPY(' ||  
      COLLID || '.' || NAME || ') ' ||  
      CASE WHEN(VERSION <> '')  
            THEN 'COPYVER(' || VERSION || ') '  
            ELSE '' END ||  
      'EXPLAIN(ONLY)'  
FROM SYSIBM.SYSPACKSTMT  
WHERE STATEMENT LIKE '%SELECT%INTO%UNION%';
```

The statement generates output similar to the following result:

```
BIND PACKAGE(DUMMYCOL) COPY(DSN_DEFAULT_COLLID_PLAY01.PLAY01) EXPLAIN(ONLY)
```

2. Copy the `SELECT` statement in a `BIND` job. If the result is longer than 72 characters, formatting is required.
3. Start and collect the IFCID 0376 trace.
4. Run the bind job that you created.
5. Stop the IFCID 0376 trace and analyze the output.

**Related information:**

## EN\_PJSJ in macro DSN6SPRM

Specifies whether to enable dynamic index ANDing, which is also called pair-wise join processing, when star join processing is enabled on DB2.

Valid values are `ON` and `OFF`. The default value is `OFF`, which means that dynamic index ANDing is disabled.

When dynamic index ANDing is enabled, it can improve the execution performance of qualified queries in the following cases:

- The fact table has indexes that provide matching for join predicates with some dimension tables having local filtering. The indexes on the fact table can be single-key indexes (but not limited).
- No multi-column index on the fact table is suitable for the existing star join method.

Therefore, setting `EN_PJSJ` to `ON` can provide more flexibility with index design on star schema fact tables when multi-column index design makes it difficult to effectively exploit the star join access method.

## HONOR\_KEEPDICTIONARY in macro DSN6SPRM

Specifies whether DB2 honors the `LOAD` and `REORG` parameter `KEEPDICTIONARY` when tables are converted between basic row format and reordered row format.

If `HONOR_KEEPDICTIONARY` is set to a value of `YES`, DB2 honors the `LOAD` and `REORG` parameter `KEEPDICTIONARY`.

If `HONOR_KEEPDICTIONARY` is set to the default value of `NO`, DB2 ignores the `LOAD` and `REORG` parameter `KEEPDICTIONARY` when tables are converted between basic row format and reordered row format.

## **IMPDSSIZE in macro DSN6SYSP**

Specifies the maximum data set size (DSSIZE) in gigabytes that DB2 should use for creating an implicit base table space.

This parameter is not used for the creation of implicit LOB or XML table spaces. Valid settings are 1, 2, 4, 8, 16, 32, 64, 128, and 256.

The default value of IMPDSSIZE is 4, unless you use SAP.

If you specify an SAP-specific input member (for example, DSNTIDXB) during installation or migration, the DSNTIJUZ job that is generated by the DB2 CLIST specifies IMPDSSIZE=64.

## **IMPTKMOD in macro DSN6SYSP**

Specifies whether DB2 is to track modifications to the pages of base table spaces.

The setting is not used for LOB or XML table spaces. Valid values are YES and NO.

The default value, YES, means that DB2 tracks changed pages of base table spaces in the space map pages. This tracking is intended to improve the performance of incremental image copies.

A value of NO means that DB2 does not track changed pages in the space map pages. DB2 uses the LRSN value in each page to determine whether a page has been changed.

If you specify an SAP-specific input member (for example, DSNTIDXB) during installation or migration, the DSNTIJUZ job that is generated by the DB2 CLIST specifies IMPTKMOD=NO.

## **INDEX\_IO\_PARALLELISM in macro DSN6SPRM**

Specifies whether I/O parallelism is enabled for index insertion.

I/O parallelism allows concurrent insert operations on multiple indexes and can reduce I/O wait time when many indexes are defined in a table. Valid values are YES and NO.

The default value is YES, which means that I/O parallelism is enabled.

## **INLISTP in macro DSN6SPRM**

Allows you to specify the maximum number of elements in an IN-list for certain IN predicate optimizations to occur.

The default value for INLISTP is 50.

## **IX\_TB\_PART\_CONV\_EXCLUDE in macro DSN6SPRM**

Specifies whether to exclude trailing columns from the table-controlled partitioning keys when table spaces are converted from index-controlled partitioning to table-controlled partitioning.

Valid values are YES or NO.

**YES** When converting from index-controlled partitioning to table-controlled

partitioning, DB2 defines the new partitioning key to use only significant columns of the original partitioning index by default. If all partitions contain 'FF'x for a column in the internal limit key value that is stored in the table's SYSINDEXPART.LIMITKEY entry, DB2 excludes that column. Such columns were specified with a value of 'FF'x, MAXVALUE, MINVALUE, or no value when the index-controlled partitioning index was defined. However, if a new limit key value is specified for a column in an ALTER TABLE statement that is issued in one of the following cases, the column is used to define the new partitioning key regardless of whether the column was originally specified with a value of 'FF'x, MAXVALUE, or MINVALUE:


- To add a new partition
- To change a partition boundary
- To rotate a partition to last on an index-controlled partitioned table space

YES is the default value.

**NO** When converting from index-controlled partitioning to table-controlled partitioning, DB2 uses all columns of the original partitioning index to define the new partitioning key. This definition includes the trailing columns of the original partitioning index that do not affect the partitioning.

This parameter does not affect the automatic conversion to table-controlled partitioning when a CREATE INDEX statement is issued with an ENDING AT clause and without a CLUSTER clause. In this case, the DB2 subsystem uses the partitioning key that is specified by the CREATE INDEX statement.

**Related concepts:**

 Automatic conversion to table-controlled partitioning (DB2 Administration Guide)

**Related reference:**

 CREATE INDEX (DB2 SQL)

## **MATERIALIZED\_NODET\_SQLTUDF in macro DSN6SPRM**

Specifies whether the DB2 database manager materializes the result of a user-defined SQL table function that is defined as NOT DETERMINISTIC.

Valid values are YES and NO.

**NO** The DB2 database manager enables the merging of a user-defined SQL table function that is defined as NOT DETERMINISTIC. This is the default setting.

**YES** The DB2 database manager materializes the result of a user-defined SQL table function that is defined as NOT DETERMINISTIC. Use this setting to avoid errors in processing SQL statements that reference those user-defined SQL table functions.

**Related reference:**

 CREATE FUNCTION (SQL table) (DB2 SQL)

## **MAX\_CONCURRENT\_PKG\_OPS in macro DSN6SPRM**

Specifies the maximum number of automatic bind requests, remote bind requests, remote rebind requests, CREATE TRIGGER statements, and CREATE PROCEDURE statements for packages that can be processed simultaneously. If the value of the

AUTO BIND field of panel DSNTIPO is set to NO, the value of MAX\_CONCURRENT\_PKG\_OPS has no effect.

The default value of MAX\_CONCURRENT\_PKG\_OPS is 10.

## MAXCONQN in macro DSN6FAC

The MAXCONQN subsystem parameter specifies the maximum number of inactive or new connections that can be queued waiting for a DBAT to process the request.

Acceptable values: OFF, ON, 1 to 19999  
Default: OFF  
DSNZPxxx: DSN6FAC MAXCONQN

**OFF** The depth of the connection queue is limited by the value of the CONDBAT subsystem parameter. The default value is OFF.

**ON** The depth of the connection queue is limited by the value of the MAXDBAT subsystem parameter.

### Numeric value

The maximum number of connections that can be queued waiting for a DBAT to process a request.

When a request is added to the connection request queue and the thresholds specified by both the MAXDBAT and MAXCONQN subsystem parameters are both reached (unless MAXCONQN is set to OFF) then DDF closes the client connection longest waiting client connection in the queue. The closed connections give remote clients an opportunity to redirect the work to other members of the group that have more resources to process the work. The function is enabled only when DB2 subsystem is a member of a data sharing group.

This subsystem parameter can be updated online.

### Related reference:

MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)

## MAXCONQW in macro DSN6FAC

The MAXCONQW subsystem parameter specifies the maximum length of time that a client connection waits for a DBAT to process the next unit-of-work or new connection request.

Acceptable values: OFF, ON, 5 to 3600 seconds  
Default: OFF  
DSNZPxxx: DSN6FAC MAXCONQW

**ON** Connections wait as long as the value specified by the IDTHTOIN subsystem parameter.

**OFF** Connections wait indefinitely for a DBAT to process requests. The default value is OFF.

### Numeric value

The time duration in seconds that a connection waits for a DBAT to process the request.

Each queued connection request entry is examined to see if its time waiting in the queue has exceeded the specified value. If the time is exceeded, the client connection is closed. The function is enabled only when DB2 subsystem is a member of a data sharing group.

This subsystem parameter can be updated online.

**Related reference:**

IDLE THREAD TIMEOUT field (IDTHTOIN subsystem parameter)

## **NPGTHRSH in macro DSN6SPRM**

Specifies whether DB2 is to use special access path selection for tables under a given size.

Unless you use SAP, the default value is 0, which means that no special access path selection is used.

## **NEWFUN in macro DSNHDECP**

Specifies the default setting for the NEWFUN SQL processing option for the DB2 precompiler and coprocessor.

Valid settings for the NEWFUN parameter in the application defaults load module (*dec*) are as follows:

- V8** Specifies that the precompiler or coprocessor can accept SQL syntax that is supported by DB2 Version 8.
- V9** Specifies that the precompiler or coprocessor can accept SQL syntax that is supported by DB2 9.
- V10** Specifies that the precompiler or coprocessor can accept SQL syntax that is supported by DB2 10. V10 is the default setting.

## **OJPERFEH in macro DSN6SPRM**

Specifies whether to disable performance enhancements for outer join operations.

This subsystem parameter is deprecated in DB2 10.

## **OPT1ROWBLOCKSORT in macro DSN6SPRM**

Specifies whether DB2 explicitly blocks sort operations when the OPTIMIZE FOR 1 ROW clause is specified on a query. Valid values are ENABLE or DISABLE.

ENABLE means that when OPTIMIZE FOR 1 ROW is specified, DB2 chooses access paths that avoid sorts whenever such a path is available. For example, DB2 must choose between two index access paths. One index is very selective and filters two rows, but it requires a sort. The other index does not filter any rows, but it does not require a sort. If the OPT1ROWBLOCKSORT subsystem parameter is set to ENABLE, DB2 chooses the path that does not require a sort.

DISABLE means that when OPTIMIZE FOR 1 ROW is specified, DB2 avoids access paths that involve sorts. If an access path that avoids a sort exists, it is possible, although unlikely, that an access path that involves a sort is chosen instead. This behavior is used in DB2 9 and earlier releases.

The default value of OPT1ROWBLOCKSORT is DISABLE.

## OPTIOPIN in macro DSN6SPRM

Controls whether DB2 is to use an enhancement to more accurately estimate the cost of accessing the inner table of a join that involves index and data access. This enhancement removes an inconsistency with the calculation of the cost for the outer table of a join.

With this subsystem parameter enabled, DB2 has a better chance to select more efficient access paths. Valid values are ENABLE and DISABLE.

ENABLE specifies DB2 is to use the costing enhancement. This setting is recommended for new installations or migrations.

DISABLE specifies that DB2 is not to use the costing environment.

ENABLE is the default value.

This subsystem parameter is deprecated in DB2 10.

## OPTIOWGT in macro DSN6SPRM

Controls how DB2 balances the I/O cost and CPU estimates when selecting access paths.

Valid values are ENABLE, DISABLE, or OFF. ENABLE specifies that when selecting access paths, DB2 is to use a new formula that better balances the cost estimates of I/O response time and CPU usage. When DISABLE is specified, ENABLE is used instead. OFF specifies that DB2 is to use the original formula to balance the CPU and I/O estimates.

ENABLE is the default value.

**Attention:** Changing the OPTIOWGT parameter could impact the access paths of queries that are otherwise stable. For more advice on how to set this parameter, contact IBM Software Support.

This subsystem parameter is deprecated in DB2 10.

## PGRNGSCR in macro DSN6SPRM

Determines whether to enable a function that is introduced by APAR PM81692.

This function allows page range screening on tables that are partitioned by TIMESTAMP columns so that the optimizer can improve the performance of queries that contain any of the following predicates:

- *TIMESTAMP < host variable or string constant*
- *TIMESTAMP <= host variable or string constant*
- *TIMESTAMP >= host variable or string constant*
- *TIMESTAMP > host variable or string constant*
- *TIMESTAMP BETWEEN host variable or string constant AND host variable or string constant*

Valid values for this parameter are NO and YES.

A value of NO specifies that this function is disabled. This is the default value.

A value of YES specifies that this function is enabled. Do not use this setting unless you are advised to do so by IBM Software Support.

This subsystem parameter is deprecated in DB2 10.

In later releases, the function is always enabled.

## **PREVENT\_NEW\_IXCTRL\_PART in macro DSN6SPRM**


The PREVENT\_NEW\_IXCTRL\_PART subsystem parameter determines whether DB2 disallows the creation of new index-controlled partitioned tables. This subsystem parameter ensures that new partitioned tables use table-controlled partitioning, which is the preferred partitioning method for non-universal table spaces.

Acceptable values:	NO, YES
Default:	NO
DSNZPxxx:	DSN6SPRM PREVENT_NEW_IXCTRL_PART

**NO** Specifies that new index-controlled partitioned tables can be created. NO is the default value.

**YES** Specifies that new partitioned table spaces must use table-controlled partitioning. A CREATE INDEX statement must not attempt to create an index-controlled partitioned table.

### **Related concepts:**

 Differences between partitioning methods (DB2 Administration Guide)

## **PRIVATE\_PROTOCOL in macro DSN6FAC**

Private protocol is no longer supported; however, this subsystem parameter controls package EXECUTE authorization behavior related to remote DB2 requester applications.

When a remote DB2 requester application accesses the server DB2 subsystem through DRDA protocol, a plan owner is associated with the remote DB2 requester application plan. For packages that are executed as part of this plan by a remote DB2 requester application using DRDA protocol, the PRIVATE\_PROTOCOL parameter has the following effects. This parameter is online updatable, and valid values are NO and AUTH.

NO indicates that when a remote DB2 requester application accesses the DB2 subsystem through DRDA protocol, package EXECUTE authority must be explicitly granted at this subsystem. The authority must be granted to the primary ID or an associated secondary ID for packages that the requester application executes as part of the plan

AUTH indicates that when a remote DB2 requester application accesses the DB2 subsystem through DRDA protocol, package EXECUTE authority must be explicitly granted to the plan owner at this subsystem. This plan owner must have EXECUTE authority at this subsystem for packages that the requester application executes as part of the plan. The plan owner needs no other privilege to execute the package.

The default value for PRIVATE\_PROTOCOL is NO.



## QUERY\_ACCEL\_OPTIONS in macro DSN6SPRM

The QUERY\_ACCEL\_OPTIONS subsystem parameter specifies additional types of SQL queries that are eligible for acceleration.

Acceptable values:	NONE, YES
Default:	NONE
DSNZPxxx:	DSN6SPRM.QUERY_ACCEL_OPTIONS (option NONE)

NONE specifies that no additional types of SQL queries are eligible. Therefore, the types of queries that are described in the other available values for this parameter are not eligible for acceleration. This is the default value.

You can specify a combination of query accelerator options other than NONE in a comma-separated list that is enclosed in parentheses. For example, (1,2).

Possible values are:

- 1 Specifies that queries that include data that is encoded with the EBCDIC mixed or graphic encoding schemes are eligible for acceleration.

If the accelerator server encodes data in another encoding scheme, such as Unicode UTF-8, the collating sequence for the data on the accelerator server is different from the collating sequence for the data in DB2. This difference affects data ordering and the results from range predicates. Therefore, if table columns include any mixture of uppercase characters, lowercase characters, numeric characters, or national language characters, and the SQL statements that query those tables include range predicates or ordering on those columns, the results of executing a query in DB2 might be different from the results of executing the same query on an accelerator server.
- 2 Specifies that an INSERT with SELECT statement is eligible for acceleration. However, only the SELECT operation of the query is processed by the accelerator server.

If the SELECT operation runs on the accelerator server, the data that is operated on by the SELECT operation might not be current in the accelerator server.
- 3 Specifies that queries that contain built-in functions for which DB2 processes each byte of the input string, rather than each character of the input string, can run on an accelerator server.

For an accelerator server that supports only functions that operate on the characters in an input string, if the input data on which the function operates contains only single-byte characters, the function returns the same result when it runs on the accelerator server and when it runs on DB2. However, if the input data contains multi-byte characters, the function returns different results when it runs on the accelerator server and when it runs on DB2.
- 4 Specifies that queries that reference an expression with a DATE data type that uses a LOCAL format are not blocked from running on an accelerator server. The accelerator server uses the format 'dd/mm/yyyy' to interpret the input and output date value.

Specify option 4 only when the DATE FORMAT field of the DSNTIP4 panel specifies LOCAL, or when application programs that process SQL on DB2 are precompiled with the DATE(LOCAL) option. In both of these

cases, the LOCAL date exit routine must define the specific 'dd/mm/yyyy' date format. If the LOCAL format is not defined as 'dd/mm/yyyy', the query might return unpredictable results.

## QUERY\_ACCELERATION in macro DSN6SPRM

The QUERY\_ACCELERATION subsystem parameter determines the default value that is to be used for the CURRENT QUERY ACCELERATION special register.

The QUERY\_ACCELERATION subsystem parameter is used when no value is explicitly set for the CURRENT QUERY ACCELERATION special register by the SQL statement SET CURRENT QUERY ACCELERATION.

Acceptable values:	1, 2, 3, 4, 5
Default:	1
DSNZPxxx:	DSN6SPRM.QUERY_ACCELERATION

### 1 (NONE)

Specifies that no query acceleration is done.

### 2 (ENABLE)

Specifies that queries are accelerated only if DB2 determines that it is advantageous to do so. If there is an accelerator failure while a query is running, or the accelerator returns an error, DB2 returns a negative SQLCODE to the application.

### 3 (ENABLE\_WITH\_FAILBACK)

Specifies that queries are accelerated only if DB2 determines that it is advantageous to do so. If the accelerator returns an error during the PREPARE or first OPEN for the query, DB2 executes the query without the accelerator. If the accelerator returns an error during a FETCH or a subsequent OPEN, DB2 returns the error to the user, and does not execute the query.

### 4 (ELIGIBLE)

Specifies that queries are accelerated if they are eligible for acceleration. DB2 does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by DB2. If there is an accelerator failure while a query is running, or the accelerator returns an error, DB2 returns a negative SQLCODE to the application.

### 5 (ALL)

Specifies that queries are accelerated if they are eligible for acceleration. DB2 does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are not executed by DB2, and an SQL error is returned. If there is an accelerator failure while a query is running, or the accelerator returns an error, DB2 returns a negative SQLCODE to the application.

## REALSTORAGE\_MANAGEMENT in macro DSN6SPRM

The REALSTORAGE\_MANAGEMENT subsystem parameter specifies whether DB2 should manage real storage consumption.

Acceptable values:	ON, OFF, AUTO
Default:	AUTO
DSNZPxxx:	DSN6SPRM REALSTORAGE_MANAGEMENT

**ON** DB2 always discards unused real storage frames. Discarding the frames

results in some CPU overhead, and this option is intended for systems in which the availability of real storage is limited. This value would most likely be appropriate for LPARs that have many DB2 subsystems, such as a development LPAR.

**OFF** DB2 does not discard unused real storage frames until one of the following conditions is met:

- The LPAR had reached an auxiliary critical state.
- The total real and auxiliary storage has reached 80% of the value of the REALSTORAGE\_MAX subsystem parameter.

**AUTO**

DB2 discards unused real storage frames when a significant amount of paging activity is detected. By discarding frames, DB2 tries to bring the system to a point where paging is limited or nonexistent. However, it might not be possible to bring the system to that point if other applications on the same LPAR cause the shortage of real storage frames. AUTO is the default value.

## **PTASKROL in macro DSN6SYSP**

Indicates whether to roll up accounting trace records from a parallel query task into the originating task's accounting trace. A value of YES means the originating task is to generate an additional accounting trace record with all the roll-up values from parallel tasks.

**Recommendation:** Use the default value of YES. A value of NO means that each parallel task produces its own accounting trace record.

## **REALSTORAGE\_MAX in macro DSN6SPRM**

Specifies the maximum GB of real and auxiliary storage that DB2 can consume. Valid values are NOLIMIT and 1 to 65535.

The default value, NOLIMIT, means that DB2's real and auxiliary storage consumption is not bounded.

If a numerical value is specified for this parameter and the total real and auxiliary storage exceeds that limit, DB2 is terminated.

The recommendation is to set this parameter to twice the amount of real and auxiliary storage that the subsystem might reasonably consume.

## **REMOTE\_COPY\_SW\_ACCEL in macro DSN6LOGP**

The REMOTE COPY SW ACCEL field specifies whether DB2 uses software to control the remote copy process for active log output in peer-to-peer remote copy (PPRC) environments.

Acceptable values:	DISABLE or ENABLE
Default:	DISABLE
Data sharing scope:	It is recommended but not required that all members use the same setting. DISABLE is recommended if the active log data sets are not on PPRC-enabled devices.
Online changeable:	Yes
DSNZPxx:	DSN6LOGP.REMOTE_COPY_SW_ACCEL

## DISABLE

The hardware PPRC function is used if available; this setting is appropriate for non-PPRC environments.

## ENABLE

Host software is used. This option can improve overall DB2 performance in PPRC environments at the expense of some additional SRB CPU time in the xxxxMSTR address space. z/OS Version 2 Release 1 or later is required to support this function.

### Related concepts:

 Storage servers and advanced features (DB2 Performance)

## REORG\_IGNORE\_FREESPACE in macro DSN6SPRM

By default, when REORG TABLESPACE is run against a partition-by-growth table space, it uses the defined PCTFREE and FREEPAGE values in the partition or table space. As data is loaded back into the table space, new partitions are created as necessary to accommodate the partition or table space's growth in size.

However, the addition of new partitions might cause the utility to fail because of a lack of disk space in the following situations:

- When REORG TABLESPACE is run against a subset of the partitions in a partition-by-growth table space
- When REORG TABLESPACE is run against a partition-by-growth table space in which a table contains LOB columns


The REORG\_IGNORE\_FREESPACE subsystem parameter controls whether DB2 ignores the PCTFREE and FREEPAGE values that are defined for partition-by-growth table spaces in these situations.

Acceptable values:	NO, YES
Default:	NO
DSNZPxxx:	DSN6SPRM REORG_IGNORE_FREESPACE

**NO** The REORG TABLESPACE utility uses the defined PCTFREE and FREEPAGE values.

**YES** DB2 uses 0 for the PCTFREE and FREEPAGE values when it reloads data into the table space. This setting can alleviate space problems when REORG TABLESPACE is run against partition-by-growth table spaces.

### Related concepts:

 Reorganization of partition-by-growth table spaces (DB2 Utilities)

## REORG\_LIST\_PROCESSING in macro DSN6SPRM

The REORG\_LIST\_PROCESSING subsystem parameter specifies the default setting for the PARALLEL option of the DB2 REORG TABLESPACE utility.

Acceptable values:	PARALLEL, SERIAL
Default:	PARALLEL
DSNZPxxx:	DSN6SPRM REORG_LIST_PROCESSING

## PARALLEL

The default value PARALLEL specifies that the REORG TABLESPACE utility is to use a default PARALLEL YES option when the PARALLEL keyword is not specified in the utility control statement. The PARALLEL

YES option specifies that the REORG TABLESPACE utility is to process all partitions that are specified in the input LISTDEF statement in a single execution of the utility.

#### **SERIAL**

SERIAL specifies that the REORG TABLESPACE utility is to use a default PARALLEL NO option when the PARALLEL keyword is not specified in the utility control statement. The PARALLEL NO option specifies that each partition that is specified in the input LISTDEF statement is to be processed in a separate execution of the utility.

### **REORG\_PART\_SORT\_NPSI in macro DSN6SPRM**

The REORG\_PART\_SORT\_NPSI subsystem parameter specifies whether the REORG TABLESPACE PART utility decides to sort all of the keys of a non-partitioned secondary index. The setting is ignored for a REORG that is not part-level or without non-partitioned secondary indexes.

Acceptable values:	NO, YES
Default:	NO
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM REORG_PART_SORT_NPSI

### **RESTRICT\_ALT\_COL\_FOR\_DCC in macro DSN6SPRM**

Specifies whether restrictions apply to ALTER TABLE ALTER COLUMN statements for target tables that are defined with the DATA CAPTURE CHANGES attribute. Valid values are NO and YES.

The default value, NO, means that restrictions do not apply to altering column data types or default values of tables that are defined with the DATA CAPTURE CHANGES attribute. For such tables, ALTER TABLE ALTER COLUMN statements with the SET DATA TYPE, SET DEFAULT, or DROP DEFAULT options are allowed.

A value of YES means that restrictions apply to altering column data types or default values of tables that are defined with the DATA CAPTURE CHANGES attribute. ALTER TABLE ALTER COLUMN statements that are issued with the SET DATA TYPE, SET DEFAULT, or DROP DEFAULT options for such tables result in SQLCODE -148.

### **RETRY\_STOPPED\_OBJECTS in macro DSN6SPRM**

The RETRY\_STOPPED\_OBJECTS subsystem parameter specifies whether DB2 immediately rejects requests for a stopped object or rechecks whether the object is started, up to the IRLM timeout limit.

Acceptable values:	NO or YES
Default:	NO
Data sharing scope:	It is recommended but not required that all members use the same setting.
Online changeable:	Yes
DSNZPxxx:	DSN6SPRM.RETRY_STOPPED_OBJECTS

**NO** DB2 immediately rejects requests for stopped objects.

YES DB2 retries requests for stopped objects in case the object is restarted, up to IRLM timeout limit, which is specified by the value of the IRLMRWT subsystem parameter.

**Related reference:**

RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)

## RETVLCFK in macro DSN6SPRM

Specifies whether the VARCHAR column is to be retrieved from a padded index. Valid values are YES or NO. The data sharing scope of this parameter is GROUP.

If you choose NO, DB2 might retrieve the non-padded value if it needs to return the non-padded value or needs the non-padded value for predicate evaluation.

If you choose YES, better performance might result because of index-only access. However, the data that is retrieved from the index is padded with blanks to the maximum length of the column. This might result in an incorrect output because predicates are applied to the padded value rather than the non-padded value, which can cause different results in some cases. Also, use of the ENCRYPT function can result in an error because of the similar issues with functions being applied to the padded value rather than the non-padded value.

**Important:** Applications must be able to handle the padding blanks. If your application is sensitive to these blanks, keep the default value of NO or consider using non-padded indexes. You must rebind plans and packages to enable the change.

**Recommendation:** Accept the default value of NO. Do not set RETVLCFK to YES unless you have tested all of your applications to make sure that none of them have any predicates that are affected by trailing blanks, none of them use the ENCRYPT function or any other function, such as the LENGTH function, that are affected by trailing blanks, and that the application logic is not affected by trailing blanks.

Use NOT PADDED indexes if you want the index to use less space, you want to allow index-only retrieval with variable characters, and you do not want the incompatible retrieval of the full column width or incorrect results.

This subsystem parameter is deprecated in DB2 10.

## SECADM1\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM1 setting is passed as a hexadecimal string or as a standard character string. Valid values are HEX or CHAR.

A value of HEX means that SECADM1 is a hexadecimal character string that represents a Unicode-encoded role name. A value of HEX is valid only when SECADM1\_TYPE=ROLE. When SECADM1\_INPUT\_STYLE is set to HEX, SECADM1 must be an even number of bytes, 2 - 256, consisting entirely of 0 - 9 and A - F.

The default value for SECADM1\_INPUT\_STYLE is CHAR, which means that SECADM1 is passed as a standard character string. If SECADM1\_TYPE=AUTHID, SECADM1 can be an authorization ID of 1 - 8 characters, or if SECADM1\_TYPE=ROLE, SECADM1 can be an ordinary SQL identifier of 1 - 128 characters.

## SECADM2\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM2 setting is passed as a hexadecimal string or as a standard character string. Valid values are HEX or CHAR.

A value of HEX means that SECADM2 is a hexadecimal character string that represents a Unicode-encoded role name. A value of HEX is valid only when SECADM2\_TYPE=ROLE. When SECADM2\_INPUT\_STYLE is set to HEX, SECADM2 must be an even number of bytes, 2 - 256, consisting entirely of 0 - 9 and A - F.

The default value for SECADM2\_INPUT\_STYLE is CHAR, which means that SECADM2 is passed as a standard character string. If SECADM2\_TYPE=AUTHID, SECADM2 can be an authorization ID of 1 - 8 characters, or if SECADM2\_TYPE=ROLE, SECADM2 can be an ordinary SQL identifier of 1 - 128 characters.

## SEQCACH in macro DSN6SPRM

Specifies whether the sequential mode is to be used to read cached data from a 3990 controller. Valid values are BYPASS and SEQ.

If you specify BYPASS, DB2 prefetch bypasses the cache.

The default value, SEQ, means that DB2 prefetch uses sequential access for read activity. Many sites gain a performance benefit by specifying SEQ.

**Recommendation:** Specify SEQ if you have current disk devices with good cache sizes, especially if the units are Enterprise Storage System (ESS) or RAMAC Virtual Array (RVA).

This subsystem parameter is deprecated in DB2 10.

## SEQPRES in macro DSN6SPRM

Some DB2 utilities scan nonpartitioning indexes and then update a subset of the pages in the indexes. The SEQPRES subsystem parameter specifies whether, when reading data, these utilities are to allow data to remain in cache longer. Valid values are YES and NO.

The default value, YES, means that these DB2 utility prefetch reads remain in cache longer, possibly improving performance of subsequent writes in the following cases for a table with very large nonpartitioned indexes:

- LOAD PART integer RESUME
- REORG TABLESPACE PART

The utility cache option is useful only with 3390 geometry disk attached to the 3990 Model 6 or later controllers.

A value of NO means that DB2 utilities use the 3990 cache the same way as any other application, which is specified by the SEQCACH subsystem parameter.

This subsystem parameter is deprecated in DB2 10.

## **SIMULATED\_CPU\_COUNT in macro DSN6SPRM**

Specifies the number of CPUs that are being simulated. This parameter is to be used for DB2 optimization modeling only. Valid values are OFF and numbers 1 - 255.

The parameter is online changeable.

The default value, OFF, means that DB2 optimizes for the number of CPUs on which it is running. This setting is recommended for production environments.

## **SIMULATED\_CPU\_SPEED in macro DSN6SPRM**

Specifies the microseconds of execution time for tasks or service request blocks (SRBs) per service unit for the CPU that is being simulated. This parameter is used only for DB2 optimization modeling.


Acceptable values:	OFF or 1 - 2,147,483,647
Default:	OFF
Online changeable:	YES
DSNZPxxx:	DSN6SPRM.SIMULATED_CPU_SPEED

**OFF** DB2 optimizes for the CPU on which it is running. Use this setting in production environments.

**1 - 2,147,483,647**

Microseconds of execution time for tasks or service request blocks (SRBs) per service unit for the CPU that is being simulated.

**Related tasks:**

 Modeling a production environment on a test subsystem (DB2 Performance)

## **SJTABLES in macro DSN6SPRM**

Specifies when DB2 is to enable star join processing.

For more information on setting this parameter, see Star schema access (DB2 Performance).

**Related concepts:**

 Star schema access (DB2 Performance)

**Related reference:**

STAR JOIN QUERIES field (STARJOIN subsystem parameter)

## **SMF89 in macro DSN6SYSP**

Specifies whether DB2 is to do detailed tracking for measured usage pricing. If you select YES, DB2 does detailed measured usage tracking if SMF type 89 records are activated.

When SMF89 is set to YES, DB2 invokes a z/OS service on every entry into or exit out of DB2 to ensure accurate tracking.

The default value is NO, which means that DB2 does not do detailed measured usage tracking. If the SMF type 89 record is activated, only high-level tracking is recorded in the SMF type 89 record. Selecting NO reduces CPU usage, but also increases the amount of time spent in DB2 as measured by SMF 89.



**Recommendation:** Select SMF89 YES only if you use measured usage pricing.

## **SMSDCFL in macro DSN6SPRM**

Specifies a DFSMS data class for table spaces. Before you set this parameter, you need to define the data classes for your table space data sets. You also need to code SMS automatic class selection (ACS) routines to assign indexes to one SMS storage class and table spaces to a different SMS storage class.

SMSDCFL is one to eight characters long. When you use DFSMS and DB2 storage groups, you can use SMSDCFL to assign table spaces to different DFSMS data classes. If you assign a value to SMSDCFL, DB2 specifies that value when it uses Access Method Services to define a data set for a table space. If the value of SMSDCFL is one or more blanks, DB2 does not specify a data class when it creates data sets for table spaces.

The default value of SMSDCFL is a blank.

This subsystem parameter is deprecated in DB2 10.

## **SMSDCIX in macro DSN6SPRM**

Specifies a DFSMS data class for indexes. Before you set this parameter, you need to define the data classes for your index data sets. You also need to code SMS automatic class selection (ACS) routines to assign indexes to one SMS storage class and table spaces to a different SMS storage class.

SMSDCIX is one to eight characters long. When you use DFSMS and DB2 storage groups, you can use the subsystem parameters SMSDCFL and SMSDCIX to assign table spaces and indexes to different DFSMS data classes. If you assign a value to SMSDCIX, DB2 specifies that value when it uses Access Method Services to define a data set for an index. If the value for SMSDCIX is one or more blanks, DB2 does not specify a data class when it creates data sets for indexes.

The default value of SMSDCIX is a blank.

This subsystem parameter is deprecated in DB2 10.

## **SQWIDSC in macro DSN6SPRM**

| Specifies whether, when RENAME TABLE or DROP ALIAS is issued against an  
| object against which there is already SQL activity, the DB2 database manager  
| performs only an invalidate operation, or performs a quiesce operation and an  
| invalidate operation on all SQL statements in the dynamic statement cache that  
| depend on that object.

| The default is NO, which means that the database manager invalidates and  
| performs a quiesce operation on SQL statements in the dynamic statement cache  
| that depend on an object that is the target of a RENAME TABLE or DROP ALIAS  
| statement.

| A value of YES means that the database manager invalidates but does not quiesce  
| SQL statements in the dynamic statement cache that depend on an object that is  
| the target of a RENAME TABLE or DROP ALIAS statement.

| In a data sharing environment, all data sharing members need to use the same  
| setting.

This parameter is deprecated.

## **STATCLUS in macro DSN6SPRM**

Specifies the type of clustering statistics that are to be collected by the RUNSTATS utility. Valid values are ENHANCED and STANDARD.

The default value is ENHANCED. The ENHANCED clustering statistics result in an improved CLUSTERRATIO formula and the statistic DATAREPEATFACTOR. These statistics allow improved SQL access paths based on improved recognition of the number of getpages that are required to retrieve the qualified rows and whether those getpages benefit from prefetch.

**Recommendation:** Use the default value of ENHANCED unless directed otherwise by IBM.

This subsystem parameter is deprecated in DB2 10.

## **SUBQ\_MIDX in macro DSN6SPRM**

Specifies whether to enable or disable multiple index access on some non-Boolean uncorrelated subquery predicates.

The following is an example of such a query:

```
SELECT *
  FROM T1
 WHERE (T1.C1= ? )
        OR (T1.C2 >= T1.C3
            AND T1.C4 = (SELECT T2.C1
                          FROM T2
                          WHERE T2.c2 = ?)
        )
```

Valid values of SUBQ\_MIDX are DISABLE and ENABLE.

A value of DISABLE means that multiple index access is not allowed for queries that have subquery predicates.

A value of ENABLE means that multiple index access is allowed for queries that have subquery predicates. This setting is recommended only when performance degradation is specifically identified for queries that have subquery predicates.

The default value of SUBQ\_MIDX is DISABLE.

## **SUPPRESS\_HINT\_SQLCODE\_DYN in macro DSN6SPRM**

Specifies whether DB2 suppresses SQLCODE +394 and SQLCODE +395 when specified access paths are applied for dynamic SQL statements. Valid values of SUPPRESS\_HINT\_SQLCODE\_DYN are NO, STMT, and ALL.

A value of NO specifies that DB2 issues SQLCODEs +394 and +395 for statement-level access paths and PLAN\_TABLE access paths. NO is the default value.

A value of STMT value specifies that DB2 suppresses SQLCODEs +394 and +395 for statement-level access paths for dynamic SQL statements.

An value of ALL specifies that DB2 suppresses SQLCODEs +394 and +395 for statement-level access paths and PLAN\_TABLE access paths for dynamic SQL statements.

The SUPPRESS\_HINT\_SQLCODE\_DYN subsystem parameter does not apply to static SQL statements or dynamic EXPLAIN statements.

**Related tasks:**

[➞](#) Specifying access paths at the statement level (DB2 Performance)

[➞](#) Specifying access paths in a PLAN\_TABLE instance (DB2 Performance)

**Related information:**

[➞](#) +394 (DB2 Codes)

[➞](#) +395 (DB2 Codes)

## TEMPLATE\_TIME in macro DSN6SPRM

The TEMPLATE\_TIME subsystem parameter specifies the default setting for the TIME option of the TEMPLATE statement.

**Tip:** Set all DB2 data sharing members to the same value.

Acceptable values:	UTC, LOCAL
Default:	UTC
DSNZPxxx:	DSN6SPRM TEMPLATE_TIME

**UTC** Coordinated Universal Time. The default value is UTC.

**LOCAL**

Local time at the DB2 database manager.

**Related reference:**

[➞](#) Syntax and options of the TEMPLATE control statement (DB2 Utilities)

## UNION\_COLNAME\_7 in macro DSN6SPRM

Specifies the behavior for result column names in UNION queries.

**NO** If the column name is the same across all sub-queries in the UNION query, the result column name is that column name. Otherwise, the result column is unnamed. NO is the default value. DB2 Version 8 introduced this behavior.

**YES** The column name that is returned in the SQLNAME field of an SQLDA following a DESCRIBE statement, where the result table that is described is the result of a union, is the column name from the first subquery of the union operation. DB2 used this behavior in DB2 Version 7 and earlier.

**Related reference:**

[➞](#) DESCRIBE (DB2 SQL)

[➞](#) The included SQLDA (DB2 SQL)

**Related information:**

## XML\_RESTRICT\_EMPTY\_TAG in DSN6SPRM

Specifies whether DB2 always serializes an empty XML element using a start-element tag followed by an end-element tag. Valid values are NO and YES. NO is the default.

A value of NO means that DB2 serializes an empty XML element in either of the following ways:

- As a start-element tag followed by an end-element tag. For example:  
`<emptyElement></emptyElement>`
- As an empty-element tag. For example:  
`<emptyElement/>`

A value of YES means that DB2 always serializes an empty XML element as a start-element tag followed by an end-element tag. For example:

`<emptyElement></emptyElement>`

## ZOSMETRICS in macro DSN6SPRM

Enables DB2 to gather z/OS metrics, including CPU usage and storage metrics, by using the z/OS Resource Measurement Facility™ (RMF™) interface. Valid values are YES and NO.

The default value of ZOSMETRICS is NO.

The following actions are required to make the RMF interface operational:

- Verify that the DSNWVRMF module is placed in the LINKLIST library. After installation, refresh the LINKLIST by issuing the following MVS command:  
`f 11a,refresh`
- Start the RMF and RMF Monitor III Sysplex Data Retrieval Service.

In some cases, the z/OS metrics might not be provided, or they might be only partially provided in the DB2 trace. This lack of metrics is likely caused by setup problems that are related to the RMF. If support is required, provide the incomplete trace data.

---

## Subsystem parameter module and application defaults module values

The subsystem parameter module is generated by job DSNTIJUZ each time that you install, migrate, or update DB2.

Six macros expand to form this data-only subsystem parameter load module. The load module contains the DB2 execution-time parameters that you selected using the ISPF panels. These six macros are DSN6ARVP, DSN6FAC, DSN6LOGP, DSN6SPRM, DSN6SYSP, and DSN6GRP. By default, this load module has the name that you specify in the PARAMETER MODULE field in panel DSNTIPO3. For more information, see PARAMETER MODULE field.

The application defaults load module, sometimes called the “DSNHDECP”, is generated by job DSNTIJUZ. This module contains the application programming defaults. By default, this load module has the name that you specify in the APPL DEFAULTS field of installation panel DSNTIPO3. For more information, see APPL DEFAULTS field.

## Data sharing

If you plan to use data sharing, see “Subsystem parameters and application defaults in a data sharing environment” on page 713.

### Related concepts:

- Subsystem parameters (Introduction to DB2 for z/OS)
- Application programming default values (Introduction to DB2 for z/OS)

### Related reference:

Directory of subsystem parameters, panel fields, and application default values

---

## DSNTIPA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

When processing is complete, this panel is displayed again. The values that you enter are saved in the ISPF profile for your authorization ID and are displayed each time that you run the CLIST.

To save your panel input, you must specify an output member name in the OUTPUT MEMBER NAME field.

The DSNTINST CLIST saves the panel input into your DSNTIDxx output member just before the CLIST issues this message:

```
DSNT4781 BEGINNING EDITED DATA SET OUTPUT
```

```
DSNTIPA1 DB2 VERSION 10 INSTALL, UPDATE, MIGRATE, AND ENFM - MAIN PANEL
====> _

Check parameters and reenter to change:
 1 INSTALL TYPE          ====> INSTALL   Install, Migrate, ENFM, or Update
 2 DATA SHARING         ====> NO       Yes or No (blank for ENFM or Update)

For migration only: Enter the release you are migrating from and the data set
and member name with the settings from the previous Installation/Migration:
 3 FROM RELEASE          ====>          V8 or V9
 4 DATA SET(MEMBER) NAME ====>

For DB2 SMP/E libraries (SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNCLST, etc.), enter:
 5 LIBRARY NAME PREFIX  ====> DSN1010
 6 LIBRARY NAME SUFFIX  ====>

For install data sets (NEW.SDSNSAMP, NEW.SDSNCLST, RUNLIB.LOAD, etc.), enter:
 7 DATA SET NAME PREFIX ====> DSN1010
 8 DATA SET NAME SUFFIX ====>

Enter to set or save panel values (by reading or writing the named members):
 9 INPUT MEMBER NAME    ====> DSNTIDXA  Default parameter values
10 OUTPUT MEMBER NAME   ====>          Save new values entered on panels
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 10. Main panel: DSNTIPA1

## Recommended approach for new installers

If you are installing for the first time, try the following suggestions.

- In the INSTALL TYPE field, enter INSTALL.

- Set the PREFIX and SUFFIX fields to the values that you used when you allocated the DB2 libraries by using job DSNALLOC.
- In the INPUT MEMBER NAME field, use DSNTIDXA (the default) for the first run. If you are using SAP, specify DSNTIDXB, the SAP-specific CLIST input member, instead. For any later runs, the CLIST sets the default input name to the prior output name.
- Specify a value in the OUTPUT MEMBER NAME field to save your options. Specify values in the TEMP CLIST LIBRARY, CLIST LIBRARY, and SAMPLE LIBRARY fields on installation panel DSNTIPT when you want output data sets tailored.

**Important:** Do not run the installation jobs before tailoring them with the CLIST. If you want to update the parameters later, the CLIST sets the default input name to the prior output name.

## INSTALL TYPE field

The value of the INSTALL TYPE field specifies whether you are installing DB2, updating DB2, migrating to DB2 10 conversion mode (from Version 8 or Version 9), or migrating to new-function mode.

Acceptable values:	INSTALL, UPDATE, MIGRATE, ENFM
Default:	INSTALL
DSNHDECP:	none

### INSTALL

Specifies that you are installing DB2 for the first time. This is the default value for the first run of the CLIST. After you complete the installation, DB2 is in new-function mode.

### UPDATE

Specifies that you are updating parameters for an existing DB2 subsystem.

### MIGRATE

Specifies that you are migrating from Version 8 to DB2 10 or from DB2 9 to DB2 10.

When you are migrating, the DATA SET(MEMBER) NAME field is required.

**ENFM** Specifies that you are migrating the DB2 catalog to new-function mode. You must run the CLIST in MIGRATE mode before you can choose this option. You should be stabilized in DB2 10 conversion mode (from Version 8 or Version 9) before using this option to move to new-function mode. In a data sharing environment, the process to migrate to new-function mode is done once for the data sharing group.

If you are updating or migrating, you use the same set of panels that you use for installation. Each panel displays all fields; however, the fields that cannot be changed in update or migrate mode are protected. This way, you can see the values that are related to ones that you want to change.

You can also choose either INSTALL or UPDATE to recheck values you that chose before.

Certain fields cannot be changed during a migration. See panels DSNTIPH, DSNTIPD, DSNTIP7, and DSNTIPP for more information. Ensure that those fields are correct in the data set member that you provide.

**Related tasks:**

Installing DB2

Migrating your DB2 subsystem to conversion mode (from Version 8 or Version 9)

Migrating your DB2 subsystem to new-function mode

Updating subsystem parameter and application default values

**Related reference:**

DSNTIPH: System resource data set names panel

DSNTIPD: Sizes panel 1

DSNTIP7: Sizes panel 2

DSNTIPP: Protection panel

## DATA SHARING field (DSHARE subsystem parameter)

The DSHARE subsystem parameter controls whether the data sharing function is to be used.

Acceptable values:	YES, NO, or blank for update and ENFM
Default:	NO
DSNZPxxx:	DSN6GRP DSHARE

Choose NO if you are not using data sharing. If you choose YES, you will continue to panel DSNTIPK after completing panel DSNTIPA2.

If you specify YES during **installation**, this window is displayed:

```
DSNTIP0A
DATA SHARING FUNCTION:
Select one.
  1. Group
  2. Member
  3. Enable
PRESS: ENTER to continue
      RETURN to exit
```

Figure 11. DSNTIP0A

### DATA SHARING FUNCTION:

Specify a data sharing function.

Acceptable values:	Group, Member, Enable
Default:	none
DSNZPxxx:	none

A value is required. After entering a value, you proceed to panels DSNTIPA2 and DSNTIPK.

If you specify YES in the DATA SHARING field during **migration**, a window is displayed asking if the current member is the first to migrate.

```
-----  
DSNTIP0B  
  
FIRST MEMBER OF GROUP TO MIGRATE?  
  
Select one.  
  1. Yes  
  2. No  
  
PRESS:  ENTER to continue  
        RETURN to exit  
-----
```

Figure 12. DSNTIP0B

## FIRST MEMBER OF GROUP TO MIGRATE?

Specify Yes if this is the first member of a data sharing group to migrate.

Acceptable values:	Yes, No
Default:	none
DSNZPxxx:	none

A value is required. After entering a value, you proceed to panels DSNTIPA2 and DSNTIPK.

### Related tasks:

- Adding a new data sharing member
- Enabling DB2 data sharing
- Installing a new data sharing group

## FROM RELEASE field

If you are migrating DB2, the FROM RELEASE field specifies whether you are migrating from Version 8 or DB2 9.

Acceptable values:	V8, V9
Default:	none
DSNZPxxx:	none

**V8** Indicates that you are migrating from Version 8 to DB2 10.

**V9** Indicates that you are migrating from DB2 9 to DB2 10.

This field must be blank if the INSTALL TYPE field is not set to MIGRATE.

## DATA SET(MEMBER) NAME field

The value of the DATA SET(MEMBER) NAME field indicates the name of the input data set to use for migrating from your Version 8 or DB2 9 release. If you are installing, migrating to new-function mode, or updating, the field must remain blank.

Acceptable values:	1 to 44 alphanumeric characters
Default:	NULL



DSNZPxxx: none

The named member contains the output parameters that were produced when you last installed, updated, or migrated the prior release of DB2. Provide the fully qualified data set name as shown in the following example:

DSN910.SDSNSAMP(DSNTIDXA)

If you no longer have this data set member, or if the one you have is incorrect, use the installation or update process from your previous release to re-create or correct the member. Enter the correct values on the panels, and save them under a new output member name. Discard the JCL that is created by this process; use the newly created member for migration.

Alternatively, you can run job DSNTIJXZ on your subsystem to create an updated data set member that contains the subsystem parameter and buffer pool settings from your previous release.

### Valid data set name

Valid data set names can be unqualified or qualified:

#### Unqualified name

One to eight alphanumeric or national characters, a hyphen, or the character 'X'C0'. The first character must be alphabetic or national. Do not use hyphens in data set names for RACF-protected data sets. For example, ALPHA is an unqualified data set name.

#### Qualified name

Multiple names joined by periods. Each name is coded like an unqualified name. Therefore, the name must contain a period within every eight characters. For example, ALPHA.PGM is a qualified data set name. The maximum length of a qualified data set name is:

- 44 characters if you use the TSO PROFILE setting NOPREFIX.
- 42 characters if you use the TSO PROFILE setting PREFIX.
- For an output tape data set, 17 characters, including periods. If the name is longer than 17 characters, only the right-most 17 characters are written to the tape header label.

#### Related tasks:

Updating the CLIST defaults input member: job DSNTIJXZ

Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)

## LIBRARY NAME PREFIX field

The LIBRARY NAME PREFIX field specifies the input prefix for the SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNDBRM, and SDSNCLST libraries.

Acceptable values:	1 to 18 characters
Default:	DSN1010
DSNZPxxx:	none

The prefix must be the same as the name that you specified for the symbolic parameter TARGPRE in SMP/E job DSNALLOC.

This is the prefix of the DB2 SMP/E target libraries. If you specify DSNTIDXA or DSNTIDXB in the INPUT MEMBER NAME field, the prefix for the INCLUDE LIBRARY field, and the prefix and suffix for the LINK LIST LIBRARY field through the IVP DATA LIBRARY field on “DSNTIPT: Data set names panel 1” on page 289 are set. If all these data sets do not have the same prefix and suffix, you can change them on installation panel DSNTIPT.

**Related reference:**

INPUT MEMBER NAME field

## LIBRARY NAME SUFFIX field

The LIBRARY NAME SUFFIX field specifies a suffix for the names of the libraries that are to be used by installation and sample jobs.

Acceptable values:	1 to 17 characters
Default:	NULL
DSNZPxxx:	none

The fully qualified data set name cannot exceed 44 characters. Names that exceed eight characters must be in groups of no more than eight characters, separated by periods.

Use a suffix only if you have added a common suffix to the following libraries when you created them in job DSNTIJAE:

<i>prefix</i> .ADSNLOAD	<i>prefix</i> .SDSNLINK	<i>prefix</i> .SDSNMACS
<i>prefix</i> .SDSNLOAD	<i>prefix</i> .SDSNEXIT	<i>prefix</i> .ADSNMACS
<i>prefix</i> .SDSNCLST	<i>prefix</i> .SDSNSAMP	<i>prefix</i> .SDSNDBRM
<i>prefix</i> .SDXRRESL	<i>prefix</i> .SDSNIVPD	

If you did not add a common suffix to these libraries, enter their correct data set names on panel DSNTIPT.

To use the default DB2 data set names, specify DSN1010 in the LIBRARY NAME PREFIX field, and leave the LIBRARY NAME SUFFIX field blank.

## DATA SET NAME PREFIX field

The DATA SET NAME PREFIX field specifies the input prefix for data sets that are to be created by the CLIST and installation, migration, and sample jobs.

Acceptable values:	1 to 18 characters that form a valid z/OS data set name prefix
Default:	DSN1010
DSNZPxxx:	none

Several of these data sets are partitioned data sets, which are deleted, if they exist, and are created or re-created during the tailoring session. If you specify DSNTIDXA or DSNTIDXB in the INPUT MEMBER NAME field, the prefix for fields 1, 2, and 3, and the prefix and suffix for fields 4, 5, and 6 on installation panel “DSNTIPT: Data set names panel 1” on page 289 are set. If all these data sets do not have the same prefix and suffix, you can change them on installation panel DSNTIPT.

## DATA SET NAME SUFFIX field

The DATA SET NAME SUFFIX field specifies the suffix for data sets that are to be created by the CLIST and installation, migration, and sample jobs.

Acceptable values:	1 to 17 characters that form a valid z/OS data set name prefix
Default:	blank
DSNZPxxx:	none

The suffix applies to the following data sets. The fully qualified data set name cannot exceed 44 characters. Names that exceed eight characters must be in groups of no more than eight characters that are separated by periods.

- *prefix*.NEW.SDSNTEMP
- *prefix*.NEW.SDSNSAMP
- *prefix*.NEW.SDSNCLST
- *prefix*.DBRMLIB.DATA
- *prefix*.RUNLIB.LOAD
- *prefix*.SRCLIB.DATA

If you do not use a common suffix to these libraries, enter their correct data set names on panel DSNTIPT.

To use the default DB2 data set names, specify DSN1010 in the DATA SET NAME PREFIX field, and leave the DATA SET NAME SUFFIX field blank.

## INPUT MEMBER NAME field

The INPUT MEMBER NAME field specifies the member name of the input data set. This data set contains the default DB2 10 parameter values that are used for installation and migration, as in *prefix*.SDSNSAMP.*suffix*.

Acceptable values:	1 to 8 characters
Default:	DSNTIDXA
DSNZPxxx:	none

### Installing DB2

If you are installing DB2 for the first time and not using SAP, use the supplied defaults input member, DSNTIDXA. If you are using SAP, you should specify DSNTIDXB, the SAP-specific input member. If you process the panels several times within a single run of the CLIST, all the previous values that are entered, except edited output data sets, remain the same.

To install DB2 using default parameter values from a previous installation, you must supply the member that contains the output from the previous run of the CLIST. That member was specified in the OUTPUT MEMBER NAME field during the previous run of the CLIST.

**Recommendation:** Before rerunning the CLIST, use job DSNTIJXZ to refresh the output member from the previous run of the CLIST.

## Migrating to conversion mode (from Version 8 or Version 9)

If you are migrating to conversion mode (from Version 8 or Version 9), you must specify two member names for input values: one in the INPUT MEMBER NAME field, and one in the DATA SET(MEMBER) NAME field. The INPUT MEMBER NAME field must specify a member that contains the default parameter values for the new release (usually DSNTIDXA, or DSNTIDXB if you use SAP). This member is applied first to establish the CLIST parameters.

The member that is specified in the DATA SET(MEMBER) NAME field must be different from the one that is specified in the INPUT MEMBER NAME field. The DATA SET(MEMBER) NAME field must specify a member that contains the values from your previous Version 8 or DB2 9 release. You can create this member by running job DSNTIJXZ on your previous release. This member is applied last and it overrides the CLIST values that are established by the member that is specified in the INPUT MEMBER NAME field.

## Migrating a data sharing group to conversion mode (from Version 8 or Version 9)

If you are migrating a data sharing group, follow the instructions under “Migrating to conversion mode (from Version 8 or Version 9)” for the first member that you migrate. You also need to specify a name in the OUTPUT MEMBER NAME field. For each subsequent member, follow the instructions under “Migrating to conversion mode (from Version 8 or Version 9),” *with the following exception*: Enter the name that you specified in the OUTPUT MEMBER NAME field when you ran the CLIST to migrate the first member.

## Migrating to new-function mode

If you are migrating to new-function mode, enter a member name for input values. The INPUT MEMBER NAME that you specify for migration to new-function mode should be the same as the OUTPUT MEMBER NAME that you specified during migration to conversion mode (from Version 8 or Version 9). In a data sharing environment, the INPUT MEMBER NAME should be the same as the OUTPUT MEMBER NAME that was specified during migration of the first member of the data sharing group to DB2 10 conversion mode (from Version 8 or Version 9).

## Updating an existing DB2 subsystem

Before running the CLIST in UPDATE mode, use job DSNTIJXZ to refresh the output member from the previous run of the CLIST. Specify the refreshed member in the INPUT MEMBER NAME field.

The following table lists the data set names that are generated with the *prefix* and *suffix* values from PREFIX and SUFFIX only when the INPUT MEMBER NAME is DSNTIDXA or DSNTIDXB.

*Table 35. Resulting data set names when using prefix and suffix parameters*

Default library name	CLIST edited library name
<i>prefix</i> .DBRMLIB.DATA	<i>prefix</i> .DBRMLIB.DATAsuffix
<i>prefix</i> .RUNLIB.LOAD	<i>prefix</i> .RUNLIB.LOAD.suffix
<i>prefix</i> .SRCLIB.DATA	<i>prefix</i> .SRCLIB.DATA.suffix
<i>prefix</i> .SDSNDBRM	<i>prefix</i> .SDSNDBRM.suffix
<i>prefix</i> .SDSNLINK	<i>prefix</i> .SDSNLINK.suffix

Table 35. Resulting data set names when using prefix and suffix parameters (continued)

Default library name	CLIST edited library name
<i>prefix</i> .SDSNLOAD	<i>prefix</i> .SDSNLOAD. <i>suffix</i>
<i>prefix</i> .SDSNMACS	<i>prefix</i> .SDSNMACS. <i>suffix</i>
<i>prefix</i> .ADSNLOAD	<i>prefix</i> .ADSNLOAD. <i>suffix</i>
<i>prefix</i> .ADSNMACS	<i>prefix</i> .SDSNMACS. <i>suffix</i>
<i>prefix</i> .SDSNSAMP	<i>prefix</i> .SDSNSAMP. <i>suffix</i>
<i>prefix</i> .SDSNCLST	<i>prefix</i> .SDSNCLST. <i>suffix</i>
<i>prefix</i> .SDSNIVPD	<i>prefix</i> .SDSNIVPD. <i>suffix</i>
<i>prefix</i> .SDSNC.H	<i>prefix</i> .SDSNC.H
<i>prefix</i> .SDXRRESL.	<i>prefix</i> .SDXRRESL. <i>suffix</i>

**Related tasks:**

Adding a new data sharing member

Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)

**Related reference:**

DATA SET(MEMBER) NAME field

## OUTPUT MEMBER NAME field

The OUTPUT MEMBER NAME field specifies the member name of the output data set in which to save the values that are entered on the installation panels.

Acceptable values:	1 to 8 characters
Default:	NULL
DSNZPxxx:	none

If you do not specify a name, the values are lost when you leave the installation CLIST, and you no longer have the values available for future updates. This member is stored in *prefix*.SDSNSAMP (not the one created by the DSNTINST CLIST). To avoid replacing any members of *prefix*.SDSNSAMP that were shipped with the product, specify DSNTIDxx as the value of OUTPUT MEMBER NAME, where xx is any alphanumeric value except SA, VB, XA, or XB.

Always give a new value in the OUTPUT MEMBER NAME field for a new panel session. You supply the name from your current session in the INPUT MEMBER NAME field for your next session. You should not use the same member name for output as for input.

**Recommendation:** Write down the output member name that you entered for reference during future sessions.

---

## DSNTIPO1: OTC license usage panel

Use the DSNTIPO1 panel to indicate whether DB2 is to operate under a one-time license charge. This panel is displayed only if you purchased DB2 10 for z/OS Value Unit Edition (FMID JDBAA1Z) for use with z/OS on zNALC.

```

+----- OTC LICENSE USAGE -----+
DSNTIPO1
Will this subsystem or data
sharing member be operated
under an OTC license?

- 1. No
- 2. Yes

PRESS: ENTER to continue
      RETURN to exit
+-----+

```

Figure 13. OTC license usage panel: DSNTIPO1

On this panel, specify whether this DB2 subsystem or data sharing member is to be configured to operate using the OTC license. Enter a 1 (NO) or 2 (YES) .

## DSNTIPO2: Notice and acceptance of OTC license panel

Panel DSNTIPO2 is displayed only when you indicate on panel DSNTIPO1 (OTC license usage) that an OTC license is or will be in effect on this DB2 subsystem or data sharing member.

This panel displays the terms of that license and checks for your consent to abide by them. Review the terms by using the ISPF Up and Down keys to scroll through the text.

```

DSNTIPO2                NOTICE AND ACCEPTANCE OF OTC LICENSE
===>

This DB2 subsystem or data sharing member has been selected for operation
using an OTC license. Use of this license is controlled by terms defined
of the following agreement:

----- TERMS -----
                                     More:  +
A "Qualified Sysplex" means a Parallel Sysplex in which z/OS is eligible for
aggregated zNALC charges as described in the Charges section of the Attach-
ment for zNALC License Charges on IBM System z.

Your license authorizes use of the Program only in a validly licensed System
z New Application License Charge ("zNALC") LPAR for Eligible Workloads which
are defined as workloads that meet the following criteria:
* A workload (excluding applications running under Lotus Domino) that in-
-----

You must accept these terms of this license in order to proceed:
LICENSE TERMS ACCEPTED ===>          Enter YES to proceed or RETURN to exit

PRESS: UP/DOWN to scroll terms  RETURN to EXIT  HELP for more information

```

Figure 14. Notice and acceptance of OTC license panel: DSNTIPO2

### LICENSE TERMS ACCEPTED field (OTC\_LICENSE subsystem parameter)

The OTC\_LICENSE subsystem parameter indicates whether you accept the terms of the one-time charge (OTC) license.

Acceptable values:	YES
Default:	none
DSNZPxxx:	DSN6SYSP.OTC_LICENSE

This field accepts only one value, YES. You cannot pass this panel with any other value in that field. If you do not accept the terms of this license, press the Return key to exit the DB2 installation CLIST.

## DSNTIPA2: DB2 catalog and directory panel

The entries on the DSNTIPA2 panel define the name of the ICF catalog for DB2 VSAM data sets and indicate whether to create the specified catalog. The entries also define z/OS Storage Management Subsystem (SMS) classes that are to be used when defining data sets for the DB2 catalog and directory.

The values that you enter on this and each of the subsequent panels are saved in the data set member that you named in the OUTPUT MEMBER NAME field on the Main Panel, DSNTIPA1.

DB2 10 requires SMS, so ensure that the following conditions are met before you proceed:

- SMS is active on the system where this DB2 subsystem resides or is being installed or migrated. SMS must be configured to allocate all data sets for the DB2 catalog and directory in extended format and to use extended addressability.
- Your system storage administrator has provided the required SMS automatic class selection (ACS) routines for data sets and DB2 storage groups created during DB2 installation or migration.
- Your system storage administrator has provided any SMS data classes, management classes, and storage classes that you plan to specify on this panel and the DSNTIPA3 panel.

To help performance and recovery, reduce dependency on a single storage device by using more than one SMS scheme.

```

DSNTIPA2          INSTALL DB2 - DB2 Catalog and Directory
====> _
Check parameters and reenter to change:

 1 CATALOG ALIAS      ====> DSNCAT   Alias of VSAM catalog for DB2 subsystem data sets
 2 DEFINE CATALOG    ====> YES      YES or NO
                        ----- SMS -----
                        DATA CLASS  MGMT CLASS  STOR CLASS
                        -----
 3 DIRECTORY AND CATALOG ====>      ====>      ====>
  DATA
 4 DIRECTORY AND CATALOG ====>      ====>      ====>
  INDEXES
 5 COMPRESS SPT01     ====> NO      Compress the SPT01 directory space
                        (NO or YES)
 6 SPT01 INLINE LENGTH ====> 32138  Max length of SPT01 inline LOB data
                        (NOINLINE or 1 - 32138)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 15. DB2 catalog and directory panel: DSNTIPA2

### CATALOG ALIAS field (CATALOG subsystem parameter)

The value of the CATALOG ALIAS field specifies the high-level qualifier for VSAM data sets that are to be used by the DB2 catalog and directory.

The installation CLIST also uses the value in the CATALOG ALIAS field to customize the following statements in DB2 installation and migration jobs:

- The NAME parameter of the DEFINE ALIAS statement for the optional VSAM ICF user catalog for DB2 data sets (job DSNTIJCA)
- The CATALOG parameter of AMS DELETE and DEFINE statements for DB2 catalog (DSNDB06), DB2 directory (DSNDB01), active logs, and bootstrap data sets (jobs DSNTIJDE, DSNTIJEN, and DSNTIJIN)
- The VCAT parameter of various CREATE STOGROUP statements (jobs DSNTIJTM, DSNTIJSG, DSNTEJ1, DSNTEJ2A, and DSNTEJ3M)

Acceptable values:	1 to 8 characters
Default:	DSNCAT
Update:	see Changing the high-level qualifier for DB2 data sets
DSNZPxxx:	DSN6SPRM CATALOG

**VSAM data set cataloging options:** The installation jobs classify the DB2 VSAM data sets, which include recovery log, subsystem, and user data sets. You must create the catalog that defines these data sets through the VSAM ICF.

**Recommendation:** Use an ICF user catalog to classify all DB2 objects because you can use aliases for user catalogs. Multi-level ICF catalog aliases are acceptable. However, when you use the CREATE STOGROUP statement, you might need to use an alias for the VCAT option, which must be a single-level one- to eight-character name. You can use a master catalog, but only if the name of the master catalog is a single-level name that is one to eight characters.

Ensure that your alias conforms to your local naming conventions. If you are migrating, you should use the same ICF catalog aliases for DB2 10 that you used for your previous version because DB2 10 uses many of the data sets from your previous version that are already classified.

Whether you are installing or migrating, DB2 does not require you to catalog all DB2 VSAM data sets in the same ICF catalog nor use the same prefix or catalog alias. However, data sets for the DB2 catalog (DSNDB06) and DB2 directory (DSNDB01) must have the high-level qualifier that you specify in the CATALOG ALIAS field. See the following table for guidelines for the high-level qualifier of data sets. The BSDS is VSAM KSDS. The archive logs are sequential. All other data sets are VSAM linear data sets.

*Table 36. DB2 data sets ICF catalog guidelines*

DB2 data sets	Guidelines
DB2 directory (DSNDB01) DB2 catalog (DSNDB06)	The first-level qualifier of these data sets must be the value that you specify in the CATALOG ALIAS field. These data sets must be SMS-managed with allocation for extended format and extended addressability.
Active logs Bootstrap data set Default database (DSNDB04) Work file database	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. You can also catalog the data sets in different ICF catalogs using different prefixes.



Table 36. DB2 data sets ICF catalog guidelines (continued)

DB2 data sets	Guidelines
Archive logs	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. If the archive log data set is allocated on disk, the data set must be cataloged according to the values of the ARCPFX1 or ARCPFX2 subsystem parameters, which are set through the COPY 1 PREFIX and COPY 2 PREFIX fields on panel DSNTIPH. If the archive log data set is allocated on a tape device, cataloging the data set is optional.
User table spaces User index spaces	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. You can catalog different user spaces in different ICF catalogs, using different prefixes.

You must provide any catalog connections for log and bootstrap data sets that you catalog apart from the DB2 directory and catalog data sets.

**Recommendation:** Add an alias for the proper catalog.

Although you can catalog two DB2 subsystems in the same ICF catalog, they must not share the same ICF catalog alias because the alias is the only parameter that makes the data set names unique.

**Data set naming conventions:** The value that you specify as the ICF catalog alias is also used as the high-level qualifier for DB2 directory and catalog VSAM data sets. The data sets for the DB2 directory and catalog databases and the default database are all VSAM linear data sets (LDSs). Their data set names have the following format:

*ddddddd.DSNDBn.bbbbbbbb.xxxxxxxx.y0001.Accc*

With the following definitions:

**ddddddd**

The high-level qualifier, which is the value that you supply for the CATALOG ALIAS field.

**DSNDBn**

A constant identifying this as a DB2 data set. For *n*, use C for a cluster name or D for a data component name.

**bbbbbbb**

The database name. The system database names are:

**DSNDB01**

The DB2 directory database

**DSNDB04**

The default database

**DSNDB06**

The DB2 catalog database

**DSNDB07**

The default work file database

xxxxxxx

The individual table space or index space.

**y0001.Accc**

The data set. For table spaces and index spaces that can be reorganized with SHRLEVEL CHANGE or SHRLEVEL REFERENCE, *y* can be I or J, depending on whether REORG has been run. For other table spaces and index spaces, *y* is I. *ccc* is the partition number of a partitioned table space or index space, or the relative data set number of a simple or segmented table space or index space.

For example, if the catalog alias is DSNCAT, one of the DB2 directory data sets is named:

```
DSNCAT.DSNDBD.DSNDB01.DBD01.I0001.A001
```

Similarly, one of the DB2 catalog data sets is named:

```
DSNCAT.DSNDBD.DSNDB06.SYSTSVIEW.I0001.A001
```

## DEFINE CATALOG field

The value of the DEFINE CATALOG field determines whether DB2 is to create a new ICF catalog.

Acceptable values:	YES, NO
Default:	YES
Update:	see Changing the high-level qualifier for DB2 data sets
DSNZPxxx:	none

**YES** Builds a new ICF catalog by using the alias that is specified in the CATALOG ALIAS field.

**NO** Signals that the catalog that is named in the CATALOG ALIAS field already exists; the CLIST does not create a new one.

If you specify YES, DB2 edits job DSNTIJCA which, when run, creates a user catalog and an alias for that catalog. DB2 creates the high-level qualifier of the catalog name by adding a number to the end of the alias that is defined in the CATALOG ALIAS field. If the alias has fewer than eight characters, DB2 appends a "1" to the end of the alias. For example, if you accept the default of DSNCAT for the CATALOG ALIAS field, the catalog that DB2 creates is named DSNCAT1.USER.CATALOG. If the alias has eight characters, DB2 changes the last character into a 1. If the last character is already a 1, DB2 changes the 1 to a 2.

## DIRECTORY AND CATALOG DATA field (CATDDACL, CATDMGCL, and CATDSTCL subsystem parameters)

The DIRECTORY AND CATALOG DATA field specifies the explicit Storage Management Subsystem (SMS) classes that are to be used for defining VSAM data sets for the DB2 catalog and directory. Your SMS storage administrator defines these SMS classes. To use ACS routines for defining these data sets, leave this field blank.

For migration, values that you enter in this field initially apply only for defining new DB2 catalog and directory data sets. Existing DB2 data sets are not changed until they are redefined as part of a REORG invoked from the DSNTIJEN job.

Table 37. Acceptable values and defaults for columns of DIRECTORY AND CATALOG DATA field

Column	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank
Update:	None	None	None
DSNZPxxx:	DSN6SPRM CATDDACL	DSN6SPRM CATDMGCL	DSN6SPRM CATDSTCL

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## DIRECTORY AND CATALOG INDEXES field (CATXDACL, CATXMGCL, and CATXSTCL subsystem parameters)

The DIRECTORY AND CATALOG INDEXES field specifies the explicit Storage Management Subsystem (SMS) classes that are to be used for defining VSAM data sets for DB2 catalog and directory indexes. Your SMS storage administrator defines these SMS classes. To use ACS routines for defining these data sets, leave this field blank.

For migration, values that you enter in this field initially apply only for defining new data sets for DB2 catalog and directory indexes. Existing DB2 catalog and directory index data sets are not changed until they are redefined as part of a REORG invoked from the DSNTIJEN job.

Table 38. Acceptable values and defaults for columns of DIRECTORY AND CATALOG INDEXES field

Column	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank
Update:	None	None	None
DSNZPxxx:	DSN6SPRM CATXDACL	DSN6SPRM CATXMGCL	DSN6SPRM CATXSTCL

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## **COMPRESS SPT01 field (COMPRESS\_SPT01 subsystem parameter)**

The value of the COMPRESS\_SPT01 subsystem parameter specifies whether the SPT01 directory table space is to be compressed.

Acceptable values:	NO, YES
Default:	NO
Update:	option 1 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM COMPRESS_SPT01

**NO** The SPT01 table space is not compressed. This is the default value.

**YES** The SPT01 table space is compressed during the next reorganization of the table space.

In a data sharing environment, all members should use the same setting for the COMPRESS\_SPT01 parameter. The result of a table space reorganization will be determined by the value of the COMPRESS\_SPT01 parameter on the member that executes the REORG TABLESPACE utility.

## **SPT01 INLINE LENGTH field (SPT01\_INLINE\_LENGTH subsystem parameter)**

The SPT01\_INLINE\_LENGTH subsystem parameter specifies the maximum length of LOB column data in the SPT01 directory table space that is to be maintained in the base table. The length is specified in single-byte characters.

This parameter applies to DB2 10 new-function mode and after step ENFM0027 of job DSNTIJEN is completed. In a data sharing environment, all members must use the same setting for this parameter.

Acceptable values:	NOINLINE, 1 to 32138
Default:	32138
Update:	option 1 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SPT01_INLINE_LENGTH

During enabling-new-function mode processing after migration from DB2 9 or DB2 Version 8, some existing columns in the SPT01 directory table are altered to BLOB columns. This subsystem parameter provides an option to allow that data to be retained in the base table (INLINE).

To optimize performance, use the largest possible setting for this parameter, which will decrease the likely number of fetches from the SPT01 LOB auxiliary tables. A large value also increases the efficiency of SPT01 compression when you specify YES for the COMPRESS\_SPT01 subsystem parameter. Use a smaller value for the SPT01\_INLINE\_LENGTH parameter to increase the capacity for storing additional rows in SPT01 if the size of SPT01 exceeds the maximum of 64 GB even with compression activated.

A change to this parameter does not take effect until you issue the SET SYSPARM command. In other words, even if you start or restart DB2 after changing the

value, the change is not honored until you issue the SET SYSPARM command. If you increase the setting, DB2 places SPT01 in REORG-pending advisory status (AREO\*) after you issue the SET SYSPARM command. If you decrease the setting, DB2 places SPT01 in REORG-pending restrictive status (REORP) after you issue the SET SYSPARM command.

**Important:** Although this subsystem parameter applies only after step ENFM0027 of job DSNTIJEN is complete, changing the parameter setting during conversion mode (from both Version 8 and Version 9) also has the previously described effect. The starting internal length of this parameter is 32138 and is retained after migration to conversion mode (from Version 8 or Version 9). Therefore, any value less than 32138 is considered a change (a decrease), and DB2 places SPT01 in REORG-pending status as previously described. To prevent this change, set the value to 32138.

If you change the setting of SPT01\_INLINE\_LENGTH for a data sharing member, change the setting on all members before running the -SET SYSPARM command on any member.

### DSNTIPA3: Data parameters panel:

The entries on the DSNTIPA3 panel define the storage management preferences for the storage groups and data sets that are created during installation and migration.

**Recommendation:** If you use dual active logging, place the two active logs on different disk volumes and, ideally, on different channels and control units. To do that, if you specify volume serial numbers explicitly in the LOG COPY 1, BSDS 2 and LOG COPY 2, BSDS 1 fields, do not use the same volume serial number for both fields.

For information about updating parameters with changes that cannot be made by using the panels, see Updating subsystem parameter and application default values.

```

DSNTIPA3          INSTALL DB2 - DATA PARAMETERS PANEL
====>  _

Check parameters and reenter to change:
 1 PERMANENT UNIT NAME  ==> 3390          Device type for MVS catalog
                                     and partitioned data sets
 2 TEMPORARY UNIT NAME  ==> SYSDA         Device type for
                                     temporary data sets

                                     ----- SMS -----
                                     VOL/SER  DATA CLASS  MGMT CLASS  STOR CLASS
                                     -----
 3 CLIST ALLOCATION      ==>              ==>          ==>          ==>
 4 NON-VSAM DATA       ==>              ==>          ==>          ==>
 5 VSAM CATALOG, DEFAULT,
  AND WORK FILE DATABASE
 6 LOG COPY 1, BSDS 2   ==>              ==>          ==>          ==>
 7 LOG COPY 2, BSDS 1   ==>              ==>          ==>          ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 16. Data parameters panel: DSNTIPA3

```

DSNTIPA3      INSTALL DB2 - DATA PARAMETERS PANEL
====>  _

Check parameters and reenter to change:
1 PERMANENT UNIT NAME  ==> 3390          Device type for MVS catalog
                                         and partitioned data sets
2 TEMPORARY UNIT NAME  ==> SYSDA        Device type for
                                         temporary data sets

                                         ----- SMS -----
                                         VOL/SER  DATA CLASS  MGMT CLASS  STOR CLASS
                                         -----
3 CLIST ALLOCATION      ==>           ==>           ==>           ==>
4 NON-VSAM DATA       ==>           ==>           ==>           ==>
5 VSAM CATALOG, DEFAULT, AND WORK FILE DATABASE
6 LOG COPY 1, BSDS 2   ==>           ==>           ==>           ==>
7 LOG COPY 2, BSDS 1   ==>           ==>           ==>           ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 17. Data parameters panel: DSNTIPA3

## PERMANENT UNIT NAME field

The PERMANENT UNIT NAME field specifies the device type or unit name that is to be used for allocating data sets that are created during installation or migration.

Acceptable values:	blank, or valid device type or unit name
Default:	3390
Update:	none
DSNZPxxx:	none

The device type or unit name applies to the following data sets:

- ICF catalog
- *prefix.DBRMLIB.DATA.suffix*
- *prefix.RUNLIB.LOAD.suffix*
- *prefix.SRCLIB.DATA.suffix*
- The two data sets that the DSNTINST CLIST generates:
  - *prefix.NEW.SDSNTEMP*
  - *prefix.NEW.SDSNSAMP*

The value of PERMANENT UNIT NAME identifies a direct access unit name for partitioned data sets and the ICF catalog. If you want to use different device types for different data sets, edit the installation or migration jobs after you complete the tailoring session. A common device type is 3390.

The value of PERMANENT UNIT NAME is sometimes used during IVP processing to place output (from COPY TABLESPACE, for example) on the device type that is specified for the PERMANENT UNIT NAME field.

A change to PERMANENT UNIT NAME during migration does not affect the ICF catalog, DB2 catalog, directory, or logs. The new value is used for data sets that are created during migration.

## TEMPORARY UNIT NAME field

The value of the TEMPORARY UNIT NAME field specifies the device type or unit name that is to be used for allocating temporary data sets.

Acceptable values:	blank, or valid device type or unit name
Default:	SYSDA
Update:	none
DSNZPxxx:	none

The value of TEMPORARY UNIT NAME is the direct access or disk unit name that is used for the precompiler, compiler, assembler, sort, linkage editor, and utility work files in the tailored jobs and CLISTS.

Be aware that this field was previously used to specify the VOLTDEVT subsystem parameter, which provides the device type that is used by DB2 utilities that dynamically allocate temporary data sets. You now specify the VOLTDEVT parameter in the TEMPORARY DS UNIT NAME field on DSNTIP61: DB2 utilities parameters panel 2.

## CLIST ALLOCATION field

The CLIST ALLOCATION field controls the storage management properties for the *prefix*.NEW.SDSNTEMP and *prefix*.NEW.SDSNSAMP data sets, which the CLIST creates during the tailoring session.

Table 39. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## NON-VSAM DATA field

The values of the NON-VSAM DATA field specify the storage management properties for non-VSAM data. Specifically, the NON-VSAM DATA field applies to the *prefix*.DBRMLIB.DATA, *prefix*.RUNLIB.LOAD, and *prefix*.SRCLIB.DATA data sets.

Table 40. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## VSAM CATALOG, DEFAULT AND WORK FILE DATABASE field

The values in the VSAM CATALOG, DEFAULT AND WORK FILE DATABASE field specify storage management properties. These properties apply to temporary data sets, the default storage group and sample storage group, and the VSAM catalog (if a new one is created).

Table 41. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

The CREATE STOGROUP statements for the default storage group and sample storage groups are tailored to include or exclude the VOLUMES, DATACLAS, MGMTCLAS, and STORCLAS parameters according to whether you specify arguments for them in this field.

- If a column is not blank, the corresponding parameter is included, with the value as its argument.
- If a column is blank, the corresponding parameter is excluded.
- If all columns are blank, the VOLUMES parameter is included, with the asterisk as its argument.

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the



corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

For migration, this field has no effect on the VSAM catalog or the default storage group because these objects are provided by the previous release of DB2.

## LOG COPY 1, BSDS 2 field

When installing DB2, you can change the values of the LOG COPY 1, BSDS 2 field. Specify the storage management properties for the first copy of the active log data set and the second copy of the bootstrap data set (BSDS).

When migrating DB2, you cannot change any values in this field.

This field has four columns where you can indicate the volume serial number and the SMS classes for data, management, and storage that are to be used for defining particular data sets or storage groups. The acceptable values and default values for each column are shown in the following table. All fields are optional.

Table 42. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## LOG COPY 2, BSDS 1 field

When installing DB2, you can change the values of the LOG COPY 2, BSDS 1 field. Use this field to specify the storage management properties for the second copy of the active log and the first copy of the BSDS.

When migrating DB2, you cannot change any values in this field.

This field has four columns where you can indicate the volume serial number and the SMS classes for data, management, and storage that are to be used for defining

particular data sets or storage groups. The acceptable values and default values for each column are shown in the following table. All fields are optional.

*Table 43. Acceptable values and defaults for field columns*

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

---

## DSNTIPK: Define group or member panel

The DSNTIPK panel follows panel DSNTIPA2 when you select a data sharing function (GROUP, MEMBER, or ENABLE).

You must start DB2 and IRLM group names with an alphabetic character. You should carefully consider the naming convention for a data sharing system. See Data sharing naming conventions for guidance on planning a naming convention before you choose names for the fields on panel DSNTIPK.

```

DSNTIPK          INSTALL DB2 - DEFINE GROUP OR MEMBER
====>  _

Check parameters and reenter to change:

1  GROUP NAME    ====> DSNCAT   Name of the DB2 group
2  MEMBER NAME   ====> DSN1    Name of DB2 member in group
3  WORK FILE DB  ====> DSN1    Work file database name for this member
4  GROUP ATTACH  ====>         Group attach name for TSO, batch, utilities
5  SUBGRP ATTACH ====>         Subgroup attach name for this member
6  COORDINATOR   ====> NO      NO or YES. Allow this member to coordinate
                                parallel processing on other members.
7  ASSISTANT      ====> NO      NO or YES. Allow this member to assist
                                with parallel processing.
8  RANDOM ATTACH ====> YES     NO or YES. Allow this member to be used
                                at random for group attachment requests
9  DEL CF STRUCTS====> NO     NO or YES. Attempt to delete coupling
                                facility structures during restart.

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 18. Define group or member panel: DSNTIPK

## GROUP NAME field (GRPNAME subsystem parameter)

The GRPNAME subsystem parameter identifies the name of a new or existing DB2 data sharing group that is to be used for this subsystem.

Acceptable values:	1 to 8 characters consisting of letters A - Z, numbers 0 - 9, \$, #, @
Default:	DSNCAT
DSNZPxxx:	DSN6GRP GRPNAME

The group name encompasses the entire data sharing group and forms the basis for the coupling facility structure names.

To avoid names that IBM uses for its z/OS cross-system coupling facility (XCF) groups, the first character must be an uppercase letter J - Z unless the name begins with DSN. Do not use SYS as the first three characters, and do not use UNDESIG as the group name.

## MEMBER NAME field (MEMBNAME subsystem parameter)

The MEMBNAME subsystem parameter specifies the name of a new or existing DB2 data sharing member that is to be used for this subsystem.

Acceptable values:	1 to 8 characters
Default:	DSN1
DSNZPxxx:	DSN6GRP MEMBNAME

**Recommendation:** Use the z/OS subsystem name. DB2 uses this name as its XCF member name. An example of a member name is DB1G. The member name can consist of letters A - Z, numbers 0 - 9, \$, #, and @.

## WORK FILE DB field

The value of the WORK FILE DB field specifies the name of the work file database that is to be used for the DB2 member.

Acceptable values:	1 to 8 characters
Default:	DSN1
DSNZPxxx:	none

Each DB2 member has its own work file database (called DSNDB07 in a non-data-sharing environment). One member of the data sharing group can have the name DSNDB07, but the recommendation is that you use a more meaningful name, such as WRKDSN1. You cannot specify a name that begins with DSNDB unless the name is DSNDB07.

## GROUP ATTACH field (SSID DECP value)

The value of the GROUP ATTACH field specifies a generic group attachment name. This name is to be used for batch programs, the call attachment facility (CAF), the RRS attachment facility (RRSAF), IMS, CICS Transaction Server for z/OS, and utilities.


Acceptable values:	1 to 4 characters
Default:	none
<i>dsnhdecy</i> :	SSID

An example of a group attachment name is DBOG. The value that you specify here is also used in the IEFSSNxx member of SYS1.PARMLIB.

If you leave this field blank, the SSID DECP value is set to the value that is specified in the SUBSYSTEM NAME field on panel DSNTIPM.

### Related concepts:

Group attachment names and subgroup attachment names

 Group attachments and subgroup attachments (DB2 Data Sharing Planning and Administration)

### Related tasks:

Registering the command prefixes, member group attachment name, and subgroup attachment name

### Related reference:

SUBSYSTEM NAME field (SSID DECP value)

## SUBGRP ATTACH field

The SUBGRP ATTACH field identifies the name of a new or existing subgroup attachment that is to be associated with this subsystem. A subgroup attachment name can be specified with a group attachment name to organize how TSO, CAF, RRSAF, JDBC, ODBC, and DB2 utilities connections find an active DB2 subsystem.

To specify subgroup attachment names, you must use DB2 10 early code.

Acceptable values:	blank, 1 to 4 characters. Characters must be letters A – Z, numbers 0 – 9, \$, #, or @
Default:	blank
Update:	modify IEFSSNxx and IPL


DSNZPxxx: none

The value that you specify for the SUBGRP ATTACH field is used in the IEFSSNxx member of SYS1.PARMLIB.

The default value, blank, means that the member that is specified in the MEMBER NAME field is not to be associated with a subgroup attachment. If a subgroup attachment name is entered in the SUBGRP ATTACH field, a group attachment name must also be specified in the GROUP ATTACH field. A subgroup attachment can belong to only one group attachment and cannot have the same name as the group attachment. A member can belong to one subgroup attachment at most.

**Related concepts:**

Group attachment names and subgroup attachment names

 [Group attachments and subgroup attachments \(DB2 Data Sharing Planning and Administration\)](#)

**Related tasks:**

Registering the command prefixes, member group attachment name, and subgroup attachment name

## COORDINATOR field (COORDNTR subsystem parameter)

The COORDNTR subsystem parameter controls whether this DB2 member is to be able to coordinate parallel processing on other members of the group.

Acceptable values: YES, NO  
Default: NO  
DSNZPxxx: DSN6GRP COORDNTR

**YES** Specifies that a read-only query on this DB2 member can be processed in part on other members of the group.

**NO** Specifies that only this DB2 member can process a query.

## ASSISTANT field (ASSIST subsystem parameter)

The ASSIST subsystem parameter controls whether this DB2 member is to be able to assist a parallelism coordinator with parallel processing.

Acceptable values: YES, NO  
Default: NO  
DSNZPxxx: DSN6GRP ASSIST

**NO** Causes this member to not be considered as an assistant at either bind time or run time.

**YES** Causes member to be considered as an assistant at both bind time and run time. To qualify as an assistant at run time, the VPPSEQT and VPXPSEQT buffer pool thresholds of this member must each be greater than zero.

## RANDOM ATTACH field (RANDOMATT subsystem parameter)

The RANDOMATT subsystem parameter specifies whether this DB2 member can be used for randomized group attachment or subgroup attachment processing. This setting is ignored when the GROUP ATTACH field is blank.

Acceptable values: YES, NO

Default: YES  
DSNZPxxx: DSN6GRP RANDOMATT


**YES**

Allows this member to be used, at random, for group attachments or subgroup attachments.

**NO** Prevents this member from being considered for group attachments or subgroup attachments unless no other members of the defined group are available.

**Related concepts:**

Group attachment names and subgroup attachment names

 [Group attachments and subgroup attachments \(DB2 Data Sharing Planning and Administration\)](#)

## DEL CF STRUCTS field (DEL\_CFSTRUCTS\_ON\_RESTART subsystem parameter)

The DEL\_CFSTRUCTS\_ON\_RESTART parameter specifies whether, during restart, DB2 is to attempt to delete the SCA, IRLM lock structure, and any allocated group buffer pools from the coupling facility.

Acceptable values: NO, YES  
Default: NO  
Update: option 3 on DSNTIPB  
DSNZPxxx: DSN6SYSP.DEL\_CFSTRUCTS\_ON\_RESTART

**NO** During restart, DB2 does not attempt to delete the data sharing group's coupling facility structures.

**Recommendation:** Use this setting for production systems.

**YES**

During restart, DB2 attempts to delete the data sharing group's coupling facility structures. The deletion is successful only if no other DB2 subsystems are connected to the structures when the deletion is attempted. If the deletion is successful, the deleted structures are recovered as necessary during a group restart or group buffer pool RECOVER-pending (GRECP) recovery process. This process might increase the amount of time that DB2 takes to complete a restart.

**Recommendation:** Use this setting for disaster recovery systems.

Use the same setting for the DEL CF STRUCTS field on all members of a data sharing group.

---

## DSNTIPH: System resource data set names panel

The entries on the DSNTIPH panel specify the names of bootstrap data sets, active logs, and archive logs. These entries also specify the number of copies (1 for single logging or 2 for dual logging) for the active and archive logs.

Fields 1, 2, 4, 5, 7, and 8 on the DSNTIPH panel contain the prefix that was entered in the CATALOG ALIAS field on installation panel DSNTIPA2. If you scroll back to panel DSNTIPA2 and change the CATALOG ALIAS value, the values

for fields 1, 2, 4, 5, 7, and 8 on DSNTIPH change. When you scroll from panel DSNTIPA2 to panel DSNTIPH, check these values and enter them again if necessary. In MIGRATE or UPDATE modes, the CATALOG ALIAS value cannot be changed, so the fields on DSNTIPH are not affected.

Dual logging improves reliability of recovering and, for active log reads, eases device contention.

**Recommendation:** Specify dual logging for both active and archive logs. If you specify dual logging, and an error occurs during offload to the archive logs, DB2 restarts the archive process using the second copy of the active log.

```

DSNTIPH          INSTALL DB2 - SYSTEM RESOURCE DATA SET NAMES
====>
DSNT443I Values marked with an asterisk have been updated
Enter data below:

Bootstrap Data Sets (BSDS):

* 1 COPY 1 NAME      ==> DSNCAT.BSDS01
* 2 COPY 2 NAME      ==> DSNCAT.BSDS02

Active Logs:
  3 NUMBER OF COPIES ==> 2          2 or 1. Number of active log copies
* 4 COPY 1 PREFIX    ==> DSNCAT.LOGCOPY1
* 5 COPY 2 PREFIX    ==> DSNCAT.LOGCOPY2

Archive Logs:
  6 NUMBER OF COPIES ==> 2          2 or 1. Number of archive log copies
* 7 COPY 1 PREFIX    ==> DSNCAT.ARCHLOG1
* 8 COPY 2 PREFIX    ==> DSNCAT.ARCHLOG2
  9 TIMESTAMP ARCHIVES ==> NO        NO, YES or EXT (Extended date format)

PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 19. System resource data set names: DSNTIPH

## COPY 1 NAME field

The value of the COPY 1 NAME field specifies the fully qualified name that is to be used for the first copy of the bootstrap data set.

Acceptable values:	valid data set name; 1 to 33 characters
Default:	DSNCAT.BSDS01 or DSNCAT.DSN1.BSDS01
Update:	option 4 on panel DSNTIPB; not during migration
DSNZPxxx:	none

For non-data-sharing environments, the default prefix is DSNCAT.BSDSxx. For data sharing environments, the default prefix is DSNCAT.DSN1.BSDSxx. The resulting data set name is DSNCAT.BSDSxx.Annnnnnnn or DSNCAT.DSN1.BSDSxx.Annnnnnnn where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to supply another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- xx is **01** for the first copy of the logs and **02** for the second copy.

- *Annmmmmn* is generated by DB2.

For the definition of a valid data set name, see Valid data set name.

## COPY 2 NAME field

The value of the COPY 2 NAME field specifies the fully qualified name that is to be used for the second copy of the bootstrap data set.

Acceptable values:	valid data set name; 1 to 33 characters
Default:	DSNCAT.BSDS02 or DSNCAT.DSN1.BSDS02
Update:	option 4 on panel DSNTIPB; not during migration
DSNZPxxx:	none

For non-data-sharing environments, the default prefix is DSNCAT.BSDSxx. For data sharing environments, the default prefix is DSNCAT.DSN1.BSDSxx. The resulting data set name is DSNCAT.BSDSxx.*Annmmmmn* or DSNCAT.DSN1.BSDSxx.*Annmmmmn* where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to supply another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- xx is **01** for the first copy of the logs and **02** for the second copy.
- *Annmmmmn* is generated by DB2.

For the definition of a valid data set name, see Valid data set name.

## NUMBER OF COPIES field (TWOACTV subsystem parameter)

The TWOACTV subsystem parameter specifies the number of copies of the active log that DB2 is to maintain: 1 (single logging) or 2 (dual logging).

Acceptable values:	1, 2
Default:	2
Update:	option 4 on panel DSNTIPB; not during migration
DSNZPxxx:	DSN6LOGP TWOACTV

Dual logging increases reliability of recovery. If your DB2 subsystem creates copies of the archive log on tape, two tape drives must be available during the offload process.

## COPY 1 PREFIX field

The value of the COPY 1 PREFIX field specifies the prefix that is to be used for the first copy of the active log data sets.

Acceptable values:	valid data set name prefix; 1 to 30 characters
Default:	DSNCAT.LOGCOPY1 or DSNCAT.DSN1.LOGCOPY1
Update:	option 4 on panel DSNTIPB; not during migration
DSNZPxxx:	none

For non-data-sharing environments, the default prefix is DSNCAT.LOGCOPYx. For data sharing environments, the default prefix is DSNCAT.DSN1.LOGCOPYx. The



resulting data set name is DSNCAT.LOGCOPYx.Annnnnnnn or DSNCAT.DSN1.LOGCOPYx.Annnnnnnn, where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to specify another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the of the MEMBER NAME field on panel DSNTIPK.
- LOGCOPY is part of the data set prefix that you can change on this panel.
- x is 1 for the first copy of the logs and 2 for the second copy.
- nnnnnnnn is the data set number.

For the definition of a valid data set name, see Valid data set name.

## COPY 2 PREFIX field

The value of the COPY 2 PREFIX field specifies the prefix that is to be used for the second copy of the active log data sets.

Acceptable values:	valid data set name prefix; 1 to 30 characters
Default:	DSNCAT.LOGCOPY2 or DSNCAT.DSN1.LOGCOPY2
Update:	option 4 on panel DSNTIPB; not during migration
DSNZPxxx:	none

If you are using single logging, accept the default value. Do not leave the entry blank.

For non-data-sharing environments, the default prefix is DSNCAT.LOGCOPYx. For data sharing environments, the default prefix is DSNCAT.DSN1.LOGCOPYx. The resulting data set name is DSNCAT.LOGCOPYx.Annnnnnnn or DSNCAT.DSN1.LOGCOPYx.Annnnnnnn, where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to specify another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- LOGCOPY is part of the data set prefix that you can change on this panel.
- x is 1 for the first copy of the logs and 2 for the second copy.
- nnnnnnnn is the data set number.

For the definition of a valid data set name, see Valid data set name.

## NUMBER OF COPIES field (TWOARCH subsystem parameter)

The TWOARCH subsystem parameter specifies the number of copies of the archive log that DB2 is to produce during offloading.

Acceptable values:	1, 2
Default:	2
Update:	option 4 on panel DSNTIPB
DSNZPxxx:	DSN6LOGP TWOARCH

If you run the installation or migration CLIST, the setting of the NUMBER OF COPIES field determines the setting of the TWOARCH subsystem parameter. Valid values of the TWOARCH subsystem parameter are NO and YES.

- 1 DB2 produces a single copy of the archive log during offloading. This setting corresponds with a value of NO for the TWOARCH subsystem parameter.
- 2 DB2 produces two copies of the archive log during offloading. Dual logging increases reliability of recovery. This setting corresponds with a value of YES for the TWOARCH subsystem parameter.

### **COPY 1 PREFIX field (ARCPFX1 subsystem parameter)**

The ARCPFX1 subsystem parameter specifies the prefix that is to be used for the first copy of the archive log data set.

Acceptable values:	valid data set name prefix; 1 to 35 characters
Default:	DSNCAT.ARCHLOG1 or DSNCAT.DSN1.ARCLG1
Update:	option 4 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP ARCPFX1

For definitions of valid data set names, see Valid data set name.

### **COPY 2 PREFIX field (ARCPFX2 subsystem parameter)**

The ARCPFX2 subsystem parameter specifies the prefix that is to be used for the second copy of the archive log data set. If you use single logging, accept the default value.

Acceptable values:	valid data set name prefix; 1 to 35 characters
Default:	DSNCAT.ARCHLOG2 or DSNCAT.DSN1.ARCLG2
Update:	option 4 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP ARCPFX2

Do not leave the COPY 2 PREFIX field blank.

### **TIMESTAMP ARCHIVES field (TSTAMP subsystem parameter)**

The TSTAMP subsystem parameter specifies whether the DB2 archive log data set name is to contain the date and time that the archive log data set was created.

Acceptable values:	NO, YES, EXT
Default:	NO
Update:	option 4 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP TSTAMP

**NO** The archive data set name does not contain a timestamp.

#### **YES**

The maximum allowable length of the user-controlled portion of the archive log prefix is reduced from 35 characters to 19 characters. This reduction in size permits the 16-character date and time qualifiers (timestamp) to be added to the archive log data set prefix. The timestamp format is as follows:

*.Dyyddd.Thhmsst,*

where:

*D* is the letter D.

*yy* is the last two digits of the year.  
*ddd* is the day of the year.  
*T* is the letter T.  
*hh* is the hour.  
*mm* is the minutes.  
*ss* is the seconds.  
*t* is tenths of a second.

#### EXT

The archive data set name contains a timestamp with an **extended** date component in the format:

*.Dyyyyddd.*

A value of EXT in this field causes the lengths of the values that are entered for field COPY 1 PREFIX and field COPY 2 PREFIX to be audited to ensure that neither exceeds 17 bytes (19 bytes for other settings of TIMESTAMP ARCHIVES).

---

## DSNTIPT: Data set names panel 1

The entries on the DSNTIPT panel establish data set names for the libraries that are used in the DB2 CLIST and JCL that DB2 provides. The values that you enter on this panel are edited into all pertinent sample and installation jobs.

You can enter these values in one of three ways: same data set name prefix, no data set name prefix, or a new data set name prefix. The following table summarizes these selections.

*Table 44. Summary of values*

<b>If you use ...</b>	<b>Then</b>
Same data set name prefix or data set names	Current data sets are deleted and reallocated for installation and migration.
No data set names	No new output is created. Previous output remains intact.
New prefix	Output is saved in new data set. Previous output remains intact.

When you run the CLIST in INSTALL or MIGRATE mode, the following warning message is displayed for any output data set that already exists:

DSNT434I WARNING, DATA SETS MARKED WITH ASTERISKS EXIST AND WILL BE OVERWRITTEN

To avoid deleting these data sets, take one of the following actions:

- Press Enter to leave the installation process.
- Change the data set names.

Press Enter again if you want to continue; this overwrites your data sets.

When you run the CLIST in UDPATE or ENFM mode, this panel is displayed immediately after panel DSNTIPA1. This allows you to check the SDSNSAMP data set name to see if it is the one you want to use for the DSNTIJUZ job. Data sets are marked with an asterisk but not deleted or reallocated if you use the same name. Instead, the data set is compressed, and only the DSNTIJUZ member is replaced within the data set. Other members in the data set are left unchanged. When the CLIST completes processing and returns to panel DSNTIPA1, the following message is displayed:

```

DSNTIPT          INSTALL DB2 - DATA SET NAMES PANEL 1
====> -

Data sets allocated by the installation CLIST for edited output:
 1 TEMP CLIST LIBRARY ==> prefix.NEW.SDSNTEMP
 2 SAMPLE LIBRARY    ==> prefix.NEW.SDSNSAMP
Data sets allocated by the installation jobs:
 3 CLIST LIBRARY     ==> prefix.NEW.SDSNCLST
 4 APPLICATION DBRM  ==> prefix.DBRMLIB.DATA.suffix
 5 APPLICATION LOAD  ==> prefix.RUNLIB.LOAD.suffix
 6 DECLARATION LIBRARY====> prefix.SRCLIB.DATA.suffix
Data sets allocated by SMP/E and other methods:
 7 LINK LIST LIBRARY ==> prefix.SDSNLINK.suffix
 8 LOAD LIBRARY      ==> prefix.SDSNLOAD.suffix
 9 MACRO LIBRARY     ==> prefix.SDSNMACS.suffix
10 LOAD DISTRIBUTION ==> prefix.ADSNLOAD.suffix
11 EXIT LIBRARY      ==> prefix.SDSNEXIT.suffix
12 DBRM LIBRARY      ==> prefix.SDSNDBRM.suffix
13 IRLM LOAD LIBRARY ==> prefix.SDXRRESL.suffix
14 IVP DATA LIBRARY ==> prefix.SDSNIVPD.suffix
15 INCLUDE LIBRARY   ==> prefix.SDSNC.H
PRESS: ENTER to continue  RETURN to exit  HELP for more information
    
```

Figure 20. Data set names panel 1: DSNTIPT

**TEMP CLIST LIBRARY** and **SAMPLE LIBRARY** are data sets that are allocated by the installation CLIST for edited output. **CLIST LIBRARY** is allocated by DSNTIJVC. If the INPUT MEMBER NAME field on installation panel DSNTIPA1 is set to DSNTIDXA or DSNTIDXB, the three data sets default to *prefix.NEW.SDSNTEMP*, *prefix.NEW.SDSNCLST*, and *prefix.NEW.SDSNSAMP* respectively. In these names, *prefix* is the value that is entered for the DATA SET NAME PREFIX field on installation panel DSNTIPA1. The following table shows the job-tailoring fields.

Table 45. Job-tailoring fields

Mode	Tailored output	No tailored output
Installing	All three fields entered	All three fields blank
Migrating	All three fields entered	All three fields blank
Updating	SAMPLE LIBRARY entered	SAMPLE LIBRARY blank

DB2 adds blanks to these fields after a successful tailoring session to avoid writing over the tailored output.

## TEMP CLIST LIBRARY field

The value of the **TEMP CLIST LIBRARY** field specifies the name of the data set where edited CLISTs are to be placed.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.NEW.SDSNTEMP</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

This field must not be blank if you are tailoring output.

## SAMPLE LIBRARY field

The value of the SAMPLE LIBRARY field specifies the name of the edited JCL library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix</i> .NEW.SDSNSAMP
Update:	option 5 on panel DSNTIPB
DSNZPxxx:	none

In update mode, the new sample library data set is not reallocated. It is compressed and member DSNTIJUZ is overwritten. This field must not be blank if you are tailoring output.

## CLIST LIBRARY field

The CLIST LIBRARY field identifies the name of the data set into which job DSNTIJVC is to load all CLISTs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix</i> .NEW.SDSNCLST
Update:	cannot change during update or ENFM
DSNZPxxx:	none

This field must not be blank if you are tailoring output.

## APPLICATION DBRM field

The value of the APPLICATION DBRM field specifies the name of the library that is to be used for DB2 sample application DBRMs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix</i> .DBRMLIB.DATA. <i>suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The APPLICATION DBRM field, APPLICATION LOAD field, and DECLARATION LIBRARY field are for DB2-provided sample applications. The names of your own development libraries are most likely different from the default values that are shown here. Job DSNTIJMV references another set of DBRMLIB, RUNLIB, and SRCLIB data sets for SYS1.PROCLIB. See Installation step 2: Define DB2 to z/OS: DSNTIJMV for more information. These fields must not be blank.

## APPLICATION LOAD field

The value of the APPLICATION LOAD field specifies the name of the DB2 sample application load module library.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix</i> .RUNLIB.LOAD. <i>suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The APPLICATION DBRM field, APPLICATION LOAD field, and DECLARATION LIBRARY field are for DB2-provided sample applications. The names of your own development libraries most likely are different from the default values that are

shown here. Job DSNTIJMV references another set of DBRMLIB, RUNLIB, and SRCLIB data sets for SYS1.PROCLIB. See Installation step 2: Define DB2 to z/OS: DSNTIJMV for more information. These fields must not be blank.

## DECLARATION LIBRARY field

The value of the DECLARATION LIBRARY field specifies the name of the DB2 declaration library that is to be used for sample application include files.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SRCLIB.DATA.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The DECLARATION LIBRARY field is for DB2-provided sample applications. The name of your own development library is most likely different from the default value for this field.

## LINK LIST LIBRARY field

The LINK LIST LIBRARY field specifies the name of the APF-authorized DB2 early code library.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNLINK.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The LINK LIST LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

## LOAD LIBRARY field

The value of the LOAD LIBRARY field specifies the name of the main APF-authorized DB2 load module library that is to be used by installation and sample jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNLOAD.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The LOAD LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

## MACRO LIBRARY field

The value of the MACRO LIBRARY field specifies the name of the macro library that is to be used by installation and sample jobs. This library contains the CICS and IMS attachment facility macros, the initialization parameter macros, and some data-mapping macros that are needed for some applications.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNMACS.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The MACRO LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

## LOAD DISTRIBUTION field

The value of the LOAD DISTRIBUTION field specifies the name of the distribution load module library that is to be used by installation and sample jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.ADSNLOAD.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The LOAD DISTRIBUTION field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

## EXIT LIBRARY field

The value of the EXIT LIBRARY field specifies the name of the library where your DSNZPxxx module, application defaults load module (*dsnhdecpl*), and exit routines are to be placed.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNEXIT.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

When you use *prefix.SDSNLOAD* and *prefix.SDSNEXIT* together, list *prefix.SDSNEXIT* first to override the IBM defaults in *prefix.SDSNLOAD*.

The EXIT LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

## DBRM LIBRARY field

The value of the DBRM LIBRARY field identifies the name of the library where the DBRMs that are shipped with DB2 are to be placed.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNDBRM.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

The DBRM LIBRARY field specifies the names of data sets that are allocated during SMP processing. This field must not be blank.

## IRLM LOAD LIBRARY field

The value of the IRLM LOAD LIBRARY field specifies the name of the IRLM load library data set that is to be used in the IRLM procedure.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDXRRESL.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

This field must not be blank. It specifies the name of a data set that is allocated during SMP processing.

## IVP DATA LIBRARY field

The value of the IVP DATA LIBRARY field specifies the data set name of SDSNIVPD. SDSNIVPD is the SMP/E target library for the DB2 installation verification procedure (IVP) input data and for the expected output from the sample applications.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNIVPD.suffix</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

## INCLUDE LIBRARY field

The value of the INCLUDE LIBRARY field identifies the name of the include library data set that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	<i>prefix.SDSNC.H</i>
Update:	cannot change during update or ENFM
DSNZPxxx:	none

This library is used in the DB2 language PROCS for C and C++.

---

## DSNTIPU: Data set names panel 2

The entries on panels DSNTIPU and DSNTIPW establish data set names for other product libraries. The values that you enter on these panels are edited into sample and installation jobs. Accept the default values for products that you do not have. Jobs for those particular products should not be run.

DB2 makes assumptions about which one of the possible C, C++, and PL/I compilers that you are using, depending on the values you supply or leave as default in the C, C++, and PL/I fields.

Many data set names for other products appear in the jobs. You can enter most of these data sets on this panel and on installation panel DSNTIPW. These names are shown in the following table as they appear in the jobs that are shipped with DB2. Change the names of the data sets if they are different at your site.

Table 46. Data set names that are used in jobs for related products

Job	Data set name	Function
DSNTEJ1	SYS1.MACLIB	Assembler macro library
	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ1L	CEE.SCEELKED	Language Environment linkage editor library
	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ1P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ1U	CEE.SCEERUN	Language Environment dynamic run time library
	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)



Table 46. Data set names that are used in jobs for related products (continued)

Job	Data set name	Function
DSNTEJ2A	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ2C	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2D	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2E	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2F	SYS1.MACLIB	Assembler macro library
	SYS1.VSF2FORT	VS Fortran run time library
DSNTEJ2P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ3C	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ3P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ4C	IMSVS.RESLIB	IMS linkage editor library
	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ4P	IMSVS.RESLIB	IMS linkage editor library
	CEE.SCEELKED	PL/I linkage editor base library
	CEE.SCEERUN	PL/I dynamic run time base library
DSNTEJ5A	CICS410.SDFHLOAD	CICS command translator and linkage editor
	CICS410.SDFHMAC	CICS macro library
	SYS1.MACLIB	Assembler macro library
DSNTEJ5C	CICS410.SDFHLOAD	CICS command translator and linkage editor library
	IGY.SIGYCOMP	Enterprise COBOL for z/OS
		See also the list of libraries that are used by DSNH CLIST in DSNH (TSO CLIST) (DB2 Commands)
DSNTEJ5P	CICS410.SDFHLOAD	CICS command translator and linkage editor library
	CICS410.SDFHPLI	CICS PL/I linkage editor library
	CEE.SCEELKED	Language Environment link editor library
DSNTEJ6D	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6R	CEE.SCEERUN	Language Environment dynamic run time library
	CEE.SCEEH.H	C library headers
	CEE.SCEELKED	Language Environment linkage editor library
DSNTEJ6S	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6T	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6U	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6V	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6W	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6Z	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ61	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ62	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ63	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ64	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ65	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ66	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ7	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ71	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ73	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ75	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ76	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ77	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ78	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJXP	CEE.SCEERUN	Language Environment dynamic run time library
DSNTIJMV	SYS1.MACLIB	Assembler macro library
	CEE.SCEERUN	Language Environment dynamic run time library

Table 46. Data set names that are used in jobs for related products (continued)

Job	Data set name	Function
	CEE.SCEELKED	Language Environment linkage editor library
	EDCPRLK	Language Environment pre-link editor library
	CEE.SCEEMSGP	Language Environment pre-link message file
	CBC.SCCNCMP	C/C++ for z/OS compiler library
	CCNDRVR	C/C++ compiler load module
	CEE.SCEEH.H	C library headers
	CEE.SCLBH.H	C++ library headers
	CEE.SCEECPP	C++ autolink library
	CBC.SCLBCPP	C++ class library
	CICS.SCLBCPP	CICS library for COBOL
	CICS.SDFHLOAD	CICS command translator and linkage editor
	CICS.SDFPLI	CICS library for PL/I
	<i>prefix</i> .SDSNLOAD(DSNHPC)	DB2 precompiler
	<i>prefix</i> .SDSNLOAD	DB2 linkage editor library
	DSNHPC	DB2 precompiler module
	GDDM.SADMSAM	GDDM macro library
	GDDM.SADMMOD	GDDM load module library
	IGY.SIGYCOMP	Enterprise COBOL for z/OS compiler library
	IGYCRCTL	Enterprise COBOL for z/OS compiler load module
	IMSVS.RESLIB	IMS linkage editor library
	ISP.SISPLOAD	ISPF ISPLINK module
	IBM.SIBMZCMP	Enterprise PL/I for z/OS compiler library
	SYS1.VSF2FORT	VS Fortran run time library

Use this panel to define the data set names of your IBM Language Environment, C/370, or C/C++ program product libraries. For more information about these libraries, consult the appropriate program product documentation. For more information about these libraries, consult the appropriate program product documentation.

Data sets that are specified on this panel are used by the DB2 installation process to tailor the DB2 language procedures that are generated by installation job DSNTIJMV:

- DSNHASM can be used to prepare DB2 programs using assembly language
- DSNHC can be used to prepare DB2 programs that use C.
- DSNHCPP can be used to prepare DB2 programs that use C++.
- DSNHCPP2 can be used to prepare a class and a client for a DB2 object-oriented program that use C++.
- DSNHCPPS contains the header file search path that is to be used by DSNHCPP and DSNHCPP2.
- DSNHFOR can be used to prepare DB2 programs using FORTRAN
- DSNHICOB can be used to prepare DB2 programs using COBOL
- DSNHPLI can be used to prepare DB2 programs using PL/I
- DSNHSQL can be used to prepare DB2 external SQL procedures

Data sets that you specify on this panel are also used by the DB2 installation process to tailor the DB2 Interactive (DB2I) program preparation CLIST, DSNH.

When the compiler fields are left blank, the DSNH CLIST and the provided JCL procedures operate differently. The DSNH CLIST issues a specific call statement,

using the default load module data set name as the argument of the call. The JCL procedures use the z/OS link list to find the data set in which the load module resides.

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Use fields 1 through 3 to specify the IBM Language Environment run time environment, link editor, and pre-link editor message libraries. The CLIST assumes that these libraries are used by all language products except FORTRAN.

Use fields 5 through 12 to define C/370 Version 2 Release 1 (C only), AD/Cycle, C/370 Version 1 Release 2 (C only), C/C++ for MVS/ESA Version 3 Release 2, C/C++ for OS/390, or C/C++ for z/OS. If you need to define C++, you must define C/C++ for C as well.

If C is not installed on your system:

- Accept the default values for fields 5 through 12.
- Do not run IVP jobs DSNTEJ2D, DSNTEJ2U, DSNTEJ6D, DSNTEJ6R, DSNTEJ6T, DSNTEJ63, DSNTEJ6W, DSNTEJ6Z, DSNTEJ64, DSNTEJ65, DSNTEJ66, DSNTEJ71, DSNTEJ73, and DSNTEJ75.

If C++ is not installed on your system:

- Accept the default values for fields 5 through 12.
- Do not run jobs DSNTEJ2E or DSNTEJ6V. Skip steps PH02US08 and PH02US09 of IVP job DSNTEJ2U.
- Remove all statements that refer to DAYNAME and MONTHNAME from part DSNTESU in the *prefix.SDSNSAMP* library if C++ is not available.

If COBOL is not installed on your system:

- Accept the default value for field 13.
- Do not run IVP jobs DSNTEJ2C, DSNTEJ3C, DSNTEJ4C, DSNTEJ5C, DSNTEJ61, DSNTEJ62, DSNTEJ76, DSNTEJ77, and DSNTEJ78.

If Fortran is not installed on your system:

- Accept the default values for fields 14 and 15.
- Do not run IVP job DSNTEJ2F.

If PL/I is not installed on your system:

- Accept the default values for field 16.
- Do not run IVP jobs DSNTEJ1P, DSNTEJ2P, DSNTEJ3P, DSNTEJ4P, DSNTEJ5P, DSNTEJ6P, DSNTEJ6S, and DSNTEJ6U.

```

DSNTIPU          INSTALL DB2 - DATA SET NAMES PANEL 2
====>

Enter data set names below:
 1 IBM LE RUNTIME LIBRARY  ==> CEE.SCEERUN
 2 IBM LE LINK EDIT LIB   ==> CEE.SCEELKED
 3 IBM LE PRELINK MSG LIB ==> CEE.SCEEMSGP
 4 HIGH LEVEL ASSEMBLER LIB ==>
 5 C/CPP COMPILER MODULE  ==> CCNDRVR
 6 C/CPP COMPILER LIBRARY ==> CBC.SCCNCMP
 7 C/CPP HEADER LIBRARY   ==> CEE.SCEEH.H
 8 C/370 COMPILER MESSAGES ==>
 9 CPP CLASS LIB HEADERS  ==> CEE.SCLBH.H
10 CPP AUTO CALL LIBRARY  ==> CEE.SCEECPP
11 CPP CLASS LIBRARY      ==> CBC.SCLBCPP
12 CPP PROCEDURE LIBRARY  ==> CBC.SCCNUTL
13 COBOL COMPILER LIBRARY ==>
14 COBOL LE PRELINKER PHASE ==> YES
15 FORTRAN COMPILER LIBRARY ==>
16 FORTRAN LINK EDIT LIB  ==> SYS1.VSF2FORT
17 PL/I COMPILER LIBRARY  ==>

PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 21. Data set names panel 2: DSNTIPU

## IBM LE RUNTIME LIBRARY field

The IBM LE RUNTIME LIBRARY field identifies the name of the IBM Language Environment dynamic run time library that is to be used by sample and installation jobs.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	CEE.SCEERUN
Update:	cannot change during update
DSNZPxxx:	none

The data set name typically includes the qualifier SCEERUN. Leave this field blank if SCEERUN is in the link list. If you enter a value in this field, it is used in the STEPLIB concatenation of the JCL procedures generated by installation job DSNTIJMV, including the following procedures:

- The DSNDBM1 and DSNDIST address spaces for DB2
- The DB2-supplied WLM procedures DSNWLM and DSNICICS
- The DB2 language procedures
- The JOBLIB concatenation of many IVP jobs

If you plan to use DB2 to run XPLINK or AMODE 64 applications, provide the SCEERUN and SCEERUN2 libraries for IBM Language Environment in the z/OS program search order. See Description of Language Environment target libraries (z/OS Language Environment Customization) for more information.

## IBM LE LINK EDIT LIB field

The IBM LE LINK EDIT LIB field identifies the name of the IBM Language Environment linkage editor library that sample and installation jobs are to use.

Acceptable values:	valid data set name: see Valid data set name
Default:	CEE.SCEELKED
Update:	cannot change during update

DSNZPxxx: none

The data set name typically includes the qualifier SCEELKED. SCEELKED is required to link-edit load modules for C, C++, COBOL, and PL/I application programs. The value that you enter here is used to customize the DB2 language procedures and the DSNH CLIST.

## IBM LE PRELINK MSG LIB field

The IBM LE PRELINK MSG LIB field identifies the data set name for messages that are to be issued by the IBM Language Environment pre-linkage editor (EDCPRLK).

Acceptable values: valid data set name: see Valid data set name  
Default: CEE.SCEEMSGP  
Update: cannot change during update  
DSNZPxxx: none

The SMP/E target data set name typically includes the qualifier SCEEMSGP. SCEEMSGP is required to pre-link edit load modules for C, C++, COBOL, and PL/I application programs. The value that you enter here is used to customize DB2 language procedures and the DSNH CLIST.

## HIGH LEVEL ASSEMBLER LIB field

The value of the HIGH LEVEL ASSEMBLER LIB field specifies the data set name of the assembler load module library. This value is to be used by sample and installation jobs.

Acceptable values: blank, or valid data set name: see Valid data set name  
Default: none  
Update: cannot change during update  
DSNZPxxx: none

The data set name typically includes the qualifier SASMMOD1. The value that you specify for this field is used to customize the DSNHASM language procedure and the DSNH CLIST. It is also added to the STEPLIB concatenation of each DB2-provided job that uses the assembler. You can leave this field blank if the library is in the link list.

## C/CPP COMPILER MODULE field

The C/CPP COMPILER MODULE field specifies the load module name of the C/370 or C/C++ compiler that is to be used on your system.

Acceptable values: blank, or valid data set name: see Valid data set name  
Default: CCNDRVR  
Update: cannot change during update  
DSNZPxxx: none

The default value is CCNDRVR for C/C++ for z/OS. The value that you enter here is used to determine the configuration for the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, the DSNH CLIST, and the IVP jobs that use C and C++. The value is used as follows:

- If the entry begins with the string “EDC”, the CLIST configures your system to use C/370.

**Important:** You cannot use C/370 and C++.

- If the entry begins with the string “CBC”, the CLIST configures your system to use C/C++ for OS/390 and C/C++ for MVS/ESA Version 3 Release 2.
- If the entry begins with any other value, including blanks, the CLIST configures your system to use C/C++ for z/OS.

## C/CPP COMPILER LIBRARY field

The C/CPP COMPILER LIBRARY FIELD specifies the name of the compiler library that is to be used for C/C++ or C/370.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	CEE.SCCNCMP
Update:	cannot change during update
DSNZPxxx:	none

This value is used to customize the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, and the DSNH CLIST. This field can be left blank if the compiler library is in the link list.

The following guidelines apply to the target data set name:

- For C/C++ for z/OS, the SMP/E target data set name typically includes the qualifier SCCNCMP.
- For C/C++ for OS/390, the SMP/E target data set name typically includes the qualifier SCBCCMP.
- For C/C++ for MVS/ESA Version 3 Release 2, the SMP/E target data set name typically includes the qualifier SCBC3CMP.
- For C/370, the SMP/E target data set name typically includes the qualifier SEDCDCMP or SEDCCOMP.

## C/CPP HEADER LIBRARY field

The C/CPP HEADER LIBRARY field specifies the name of the header include library that is to be used for C/C++ or C/370.

Acceptable values:	blank, or valid load module name: see Valid data set name
Default:	CEE.SCEEH.H
Update:	cannot change during update
DSNZPxxx:	none

- For C/C++, the SMP/E target data set name typically includes the qualifier SCEEH.H.
- For C/370, the SMP/E target data set name typically includes the qualifier SEDCDCMP or SEDCCOMP.

This value is used to customize the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, and the DSNH CLIST. This field can be left blank if the compiler library is in the link list.

## C/370 COMPILER MESSAGES field

The value of the C/370 COMPILER MESSAGES field is the name of the message library that is to be used for the C/370 compiler.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	none
Update:	cannot change during update
DSNZPxxx:	none

The data set name typically includes the qualifier SEDCDMSG or SEDCMSGS. If you are using C or C++, leave this field blank. This value is used to customize the DSNHC and DSNHSQL language procedures and the DSNH CLIST.

You can specify C/C++ for MVS/ESA V3R1, or C/C++ for MVS/ESA V3R2. These are shipped as single products, but you need to define them separately on this line and on line 1, depending on your need for C or C++. If you specify a name in this field, a STEPLIB is added to the compiler step of the DSNHCPP and DSNHCPP2 procedures in job DSNTIJMV, and to the C++ portion of the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.

## CPP CLASS LIB HEADERS field

The value of the CPP CLASS LIB HEADERS field specifies the data set name for the C++ class header files.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	CBC.SCLBH.H
Update:	cannot change during update
DSNZPxxx:	none

Accept the default value if C++ is not available on your system.

- For C/C++ for z/OS and C/C++ for OS/390, the data set name typically includes the qualifier CBC.SCLBH.H.
- For C/C++ for MVS/ESA V3R2, the data set name typically includes the qualifier SCLB3H.HPP.

If you specify a name in this field, it is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP AUTO CALL LIBRARY field

The value of the CPP AUTO CALL LIBRARY field specifies the data set name of the C++ auto call library.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	CEE.SCEECPP
Update:	cannot change during update
DSNZPxxx:	none

This data set name typically includes the qualifier SCEECPP. Accept the default value if C++ is not available on your system. The value of the CPP AUTO CALL LIBRARY field is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP CLASS LIBRARY field

The value of the CPP CLASS LIBRARY field specifies the data set name of the C++ class library.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	CEE.SCLBCPP
Update:	cannot change during update
DSNZPxxx:	none

Accept the default value if C++ is not available on your system.

- For C/C++ for z/OS and C/C++ for OS/390, the data set name typically includes the qualifier SCLBCPP.
- For C/C++ for MVS/ESA V3R2, the data set name typically includes the qualifier SCLB3CPP.

The value of the CPP CLASS LIBRARY field is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP PROCEDURE LIBRARY field

The value of the CPP PROCEDURE LIBRARY field specifies the data set name for the C++ procedure library.

Acceptable values:	valid data set name: see Valid data set name
Default:	CEE.SCCNUTL
Update:	cannot change during update
DSNZPxxx:	none

Accept the default value if C++ is not available on your system.

- For C/C++ for z/OS, the data set name typically includes the qualifier SCCNUTL.
- For C/C++ for OS/390, the data set name typically includes the qualifier SCBCUTL.
- For C/C++ for MVS/ESA V3R2, the data set name typically includes the qualifier SCBC3UTL.

## COBOL COMPILER LIBRARY field

The value of the COBOL COMPILER LIBRARY field identifies the name of the compiler library that is to be used for COBOL.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	none
Update:	cannot change during update
DSNZPxxx:	none

The data set name typically includes the qualifier SIGYCOMP. The value that you enter here is used to customize the DSNHICOB language procedure and the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.



## COBOL LE PRELINKER PHASE field

The value of the COBOL LE PRELINKER PHASE field indicates whether to customize the DSNHICOB language procedure to include a procedure step that executes the IBM Language Environment prelinker.

Acceptable values:	NO or YES
Default:	YES
Update:	cannot change during update
DSNZPxxx:	none

**NO** Specifies that the DSNHICOB procedure is customized to prepare COBOL programs without using the prelinker. NO is required when using IBM Enterprise COBOL Version 5.1 and later releases. It is acceptable for older versions of the COBOL compiler that are supported by this release of DB2. Additional DD statements are allocated for the COBOL compiler and object code is passed directly from the compiler to the z/OS binder to create a program object, which must reside in a partitioned data set extended (PDSE).

**YES** Specifies that the DSNHICOB procedure is customized to prepare COBOL programs using the prelinker. YES is acceptable only when using IBM Enterprise COBOL Version 4.2 and older releases. Object code is passed from the compiler to the IBM Language Environment prelinker and then to the z/OS binder. The binder creates a load module if the output library is a partitioned data set (PDS). It creates a program object if the output library is a PDSE. YES is the default setting.

## FORTRAN COMPILER LIBRARY field

The FORTRAN COMPILER LIBRARY field identifies the data set name of the Fortran compiler library that is to be used by the DB2 installation process.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	none
Update:	cannot change during update
DSNZPxxx:	none

If you specify a value here, it is used to customize the DSNHFOR language procedure and the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.

## FORTRAN LINK EDIT LIB field

The FORTRAN LINK EDIT LIB field identifies the data set name of the Fortran linkage editor library that is to be used by the DB2 installation process.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	SYS1.VSF2FORT
Update:	cannot change during update
DSNZPxxx:	none

The value that you enter here is used to customize the DSNHFOR language procedure and the DSNH CLIST. Accept the default value if FORTRAN is not available on your system, and do not run IVP job DSNTIJ2F.

## PL/I COMPILER LIBRARY field

The value of the PL/I COMPILER LIBRARY field specifies the name of the PL/I compiler library that is to be used by installation and sample jobs.

Acceptable values:	blank, or valid data set name: see Valid data set name
Default:	none
Update:	cannot change during update
DSNZPxxx:	none

For Enterprise PL/I, the data set name typically includes the qualifier SIBMZCMP. The value that you enter here is used to customize the DSNHPLI language procedure and the DSNH CLIST. You can leave the field blank if the PL/I compiler library is in the system link list.

---

## DSNTIPW: Data set names panel 3

The entries on the DSNTIPW panel establish data set names for the libraries of other products in your system. The values that are entered on this panel are edited into all pertinent sample and installation jobs.

If you do not have the product, accept the default. The default cannot be blank.

Many data set names for other products appear in the jobs. You can enter most of these data set names on this panel and on installation panel DSNTIPU. These names are shown in the table in Data set names panel 2: DSNTIPU as they appear in the jobs that are shipped with DB2. Change the names of the data sets if they are different at your site.

```
DSNTIPW          INSTALL DB2 - DATA SET NAMES PANEL 3
====>

Enter data set names below:
 1 SYSTEM MACLIB      ==> SYS1.MACLIB
 2 SYSTEM PROCEDURES ==> SYS1.PROCLIB
 3 SORT LIBRARY      ==> SYS1.SORTLIB
 4 IMS RESLIB        ==>
 5 ISPF ISPLINK MODULE ==> ISP.SISPLMOD
 6 GDDM MACLIB       ==> GDDM.SADMSAM
 7 GDDM LOAD MODULES ==> GDDM.SADMMOD
 8 CICS LOAD LIBRARY ==> CICSTS.SDFHLOAD
 9 CICS MACRO LIBRARY ==> CICSTS.SDFHMAC
10 CICS COBOL LIBRARY ==> CICSTS.SDFHCOB
11 CICS PL/I LIBRARY  ==> CICSTS.SDFHPL1
12 CICS EXCI LIBRARY  ==> CICSTS.SDFHEXCI

PRESS: ENTER to continue RETURN to exit HELP for more information
```

Figure 22. Data set names panel 3: DSNTIPW

## SYSTEM MACLIB field

The value of the SYSTEM MACLIB field specifies the data set name of the assembler macro library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
--------------------	--

Default:	SYS1.MACLIB
Update:	cannot change during update
DSNZPxxx:	none

## SYSTEM PROCEDURES field

The value of the SYSTEM PROCEDURES field specifies the data set name of the system procedures library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	SYS1.PROCLIB
Update:	cannot change during update
DSNZPxxx:	none

## SORT LIBRARY field

The value of the SORT LIBRARY field specifies the name of the data set where the DFSORT load module resides.

Acceptable values:	valid data set name: see Valid data set name
Default:	SYS1.SORTLIB
Update:	cannot change during update
DSNZPxxx:	none

If you use the DB2 Sort for z/OS product, DB2 does not use the value of this field. However, you should set this value to a valid data set name in case you need to use DFSORT as a fallback. The following guidance applies if you set the DB2SORT subsystem parameter to DISABLE or DB2 Sort for z/OS is not installed.

If you use DFSORT, and your load library is not in the link list, you can change the DSNUPROC JCL procedure in job DSNTIJMV.

If DFSORT is installed as your primary z/OS sort product, you do not need to take any action to make DFSORT available to DB2. If multiple releases of DFSORT are installed, ensure that DFSORT R14 is found first in the system search order.

If DFSORT is not installed as your primary z/OS sort product, use one of the following methods to enable DB2 to use DFSORT:

- Add the DFSORT SORTLPA library to the link pack area list; then add the DFSORT SICELINK library to the link list.
- Add the DFSORT SICELINK library to the link list; then add the DFSORT SORTLPA library to the link list.

**Important:** If any non-IBM primary sort product is installed in the link list, install DFSORT in the link list, in system search order, after the non-IBM primary sort product.

**Recommendation:** If any non-IBM primary sort product is installed in the link pack area, add the DFSORT libraries to the link list.

- Add the DFSORT SICELINK library to the JOBLIB statement; then add the DFSORT SORTLPA library to the JOBLIB statement.
- Add the DFSORT SICELINK library to the STEPLIB DD statement; then add the DFSORT SORTLPA library to the STEPLIB DD statement.

- Add the DFSORT modules to a private library that is equivalent to one of the above configurations.

**Important:** If your non-IBM primary sort product is run from a private library, you must use DFSORT in the same way.


If you install DFSORT in the link pack area or link library, you must install it after you install the non-IBM primary sort product.

DB2 uses only the SORT and MERGE functions in DFSORT. If you want to use DFSORT for any other uses outside of this limited DB2 support, you must separately order and license DFSORT.

**Related reference:**

UT DB2 SORT USE field (DB2SORT subsystem parameter)

**Related information:**

 [DFSORT Installation and Customization](#)

## IMS RESLIB field

The IMS RESLIB field identifies the data set name of the IMS linkage editor library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	none
Update:	cannot change during update
DSNZPxxx:	none

If you do not have IMS, you do not need to connect DB2 to IMS, and you can skip the phase 4 sample application jobs DSNTEJ4C and DSNTEJ4P.

## ISPF ISPLINK MODULE field

The ISPF ISPLINK MODULE field identifies the data set name of the ISPF load module library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	ISPSISLOAD
Update:	cannot change during update
DSNZPxxx:	none

## GDDM MACLIB field

The GDDM MACLIB field identifies the data set name of the GDDM macro library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	GDDM.SADMSAM
Update:	cannot change during update
DSNZPxxx:	none

This field and the GDDM LOAD MODULES field must both have a valid data set name or must both be blank. The data set name that you specify in this field is included in the compiler step SYSLIB DD concatenations of DSNHASM, DSNHC,

DSNHCOB, DSNHCOB2, DSNHICOB, DSNHICB2, and DSNHPLI. The installation CLIST only generates sample jobs DSNTEJ75 and DSNTEJ78 if you specify a GDDM MACLIB name.

## **GDDM LOAD MODULES field**

The GDDM LOAD MODULES field identifies the data set name of the GDDM load module library that is to be used by sample and installation jobs.

Acceptable values:	valid data set name: see Valid data set name
Default:	GDDM.SADMMOD
Update:	cannot change during update
DSNZPxxx:	none

This field and the GDDM MACLIB field must both have a valid data set name or must both be blank. The data set name that you specify in this field is included in the link-edit SYSLIB concatenations of DSNHASM, DSNHC, DSNHCOB, DSNHCOB2, DSNHICOB, DSNHICB2, and DSNHPLI.

## **CICS LOAD LIBRARY field**

The CICS LOAD LIBRARY field identifies the data set name that is to be used for the CICS load module library.

Acceptable values:	valid data set name: see Valid data set name
Default:	CICSTS.SDFHLOAD
Update:	cannot change during update
DSNZPxxx:	none

If you do not use CICS, use a blank in the CICS LOAD LIBRARY field.

## **CICS MACRO LIBRARY field**

The CICS MACRO LIBRARY field identifies the data set name that is to be used for the CICS macro library.

Acceptable values:	valid data set name: see Valid data set name
Default:	CICSTS.SDFHMAC
Update:	cannot change during update
DSNZPxxx:	none

## **CICS COBOL LIBRARY field**

The CICS COBOL LIBRARY FIELD specifies the data set name for the CICS library that the COBOL programs are to use.

Acceptable values:	valid data set name: see Valid data set name
Default:	CICSTS.SDFHCOB
Update:	cannot change during update
DSNZPxxx:	none

## **CICS PL/I LIBRARY field**

The CICS PL/I LIBRARY field identifies the data set name for the CICS library that PL/I programs are to use.

Acceptable values:	valid data set name: see Valid data set name
Default:	CICSTS.SDFHPLI
Update:	cannot change during update
DSNZPxxx:	none

## CICS EXCI LIBRARY field

The CICS EXCI LIBRARY field identifies the data set name for the CICS library that contains the CICS EXCI load modules.

Acceptable values:	valid data set name: see Valid data set name
Default:	CICS.SDFHEXCI
Update:	cannot change during update
DSNZPxxx:	none

---

## DSNTIPD: Sizes panel 1

The entries on the DSNTIPD panel establish the size of the DB2 catalog, directory, and log data sets. Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

The values that you supply on this panel are estimates that are used in calculating sizes for main storage and data sets. The values do not reduce any system limits and do not preclude an application or user from exceeding these estimates, within reasonable limits. For example, if you specify 500 databases, you could create 600. However, if you exceed the values by a large margin, you might encounter a shortage of main storage or use many secondary extents for some data sets. You can usually change the main storage values by using the next panel. If you cannot change these values, see Updating subsystem parameter and application default values for the appropriate method.

The installation CLIST contains formulas that calculate the space for each catalog data set and the indexes that DB2 requires for each data set. Data that you enter on this panel is used in these formulas. Use integers. Do not enter fractions. You can use K (as in 32 K) for multiples of 1024 bytes and M (as in 16 M) for multiples of 1,048,576 bytes in most fields, but do not exceed the maximum value that is accepted by the field. For example, for the PACKAGE LISTS field, which has a maximum of 32,000, you can enter 31 K, meaning 31,744 bytes. Values of 32 K and above exceed the maximum acceptable value for this field.

Many of the fields on this panel affect the values of the EDMPOOL, EDMSTATC, and EDMDBDC parameters in macro DSN6SPRM.

If you are migrating, DB2 10 adopts the DB2 catalog, directory, BSDS, and active logs from your previous version. Therefore, during migration, you cannot change any of the fields on this panel that affect those data sets.

### Updating the parameters:

You can alter the characteristics of the DB2 catalog, directory, BSDS, and active and archive logs by using the methods described on Updating subsystem parameters that cannot be updated by using DSNTIPB. You cannot actually change the values of these parameters.

```

DSNTIPD          INSTALL DB2 - SIZES PANEL 1
====>  _

Check numbers and reenter to change:
 1 DATABASES      ====> 200      In this subsystem
 2 TABLES        ====> 20      Per database (average)
 3 COLUMNS        ====> 10      Per table (average)
 4 VIEWS           ====> 3       Per table (average)
 5 TABLE SPACES  ====> 20      Per database (average)
 6 PLANS           ====> 200     In this subsystem
 7 PLAN STATEMENTS ====> 30     SQL statements per plan (average)
 8 PACKAGES        ====> 300     In this subsystem
 9 PACKAGE STATEMENTS ====> 10  SQL statements per package (average)
10 PACKAGE LISTS  ====> 2       Package lists per plan (average)
11 EXECUTED STMTS ====> 15     SQL statements executed (average)
12 TABLES IN STMT ====> 2     Tables per SQL statement (average)
13 LOB INLINE LENGTH ====> 0   Default length of inline LOBs (0-32680)
14 USER LOB VALUE STG ====> 10240 Max KB storage per user for LOB values
15 SYSTEM LOB VAL STG ====> 2048 Max MB storage per system for LOB values
16 USER XML VALUE STG ====> 204800 Max KB storage per user for XML values
17 SYSTEM XML VAL STG ====> 10240 Max MB storage per system for XML values

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 23. Sizes panel 1: DSNTIPD

**Related tasks:**

Calculating storage requirements with the installation CLIST

**Related reference:**

DSNTIPC: CLIST calculations panel 1

## DATABASES field for panel DSNTIPD

The value of the DATABASES field of panel DSNTIPD indicates the estimated number of user databases that are to exist in your subsystem.

Acceptable values:	1 to 64000
Default:	200
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## TABLES field

The value of the TABLES field indicates the estimated average number of tables that is to exist for each database in your subsystem.

Acceptable values:	1 to 400
Default:	20
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## COLUMNS field

The value of the COLUMNS field identifies the average number of columns per table in your subsystem. This value is to be used in calculating sizes for main storage and data sets.

Acceptable values:	1 to 750
Default:	10

Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## VIEWS field

The value of the VIEWS field specifies the estimated average number of views that are to exist for each table in your subsystem.

Acceptable values:	1 to 200
Default:	3
Update:	see Updating subsystem parameter and application default values
DSNZPxxx:	none

## TABLE SPACES field

The value of the TABLE SPACES field indicates the estimated average number of table spaces that is to exist per database in your subsystem.

Acceptable values:	1 to 400
Default:	20
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## PLANS field

The value of the PLANS field is the estimated number of application plans that are to exist in your subsystem. Each program requires a separate application plan.

Acceptable values:	1 to 32000
Default:	200
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## PLAN STATEMENTS field

The value of the PLAN STATEMENTS field specifies the estimated average number of SQL statements that are to exist for each application plan.

Acceptable values:	1 to 32000
Default:	30
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## PACKAGES field

The value of the PACKAGES field specifies the estimated number of packages that are to exist in the system.

Acceptable values:	1 to 256000
Default:	300



Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## PACKAGE STATEMENTS field

The value of the PACKAGE STATEMENTS field specifies the estimated number of individual SQL statements that are to exist for each package.

Acceptable values:	1 to 32000
Default:	10
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## PACKAGE LISTS field

The value of the PACKAGE LISTS field is the average number of packages that are estimated to be in a package list for each plan.

Acceptable values:	1 to 32000
Default:	2
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

## EXECUTED STMTS field

The value of the EXECUTED STMTS field is an estimate of the average number of SQL statements that are to be executed per plan.

Acceptable values:	1 to 32000
Default:	15
Update:	see Updating subsystem parameter and application default values; not during migration
DSNZPxxx:	none

The number of SQL statements that are executed can be less than the number of statements that are written.

## TABLES IN STMT field

The value of the TABLES IN STMT field indicates the estimated average number of tables that is to be used per SQL statement.

Acceptable values:	1 to 16
Default:	2
Update:	see Updating subsystem parameter and application default values; cannot update during migration
DSNZPxxx:	none

Some SQL statements use more than one table (for example, those using joins, unions, or subselect clauses). Consider how often you expect to use such statements when choosing a value for this parameter.

## LOB INLINE LENGTH field (LOB\_INLINE\_LENGTH subsystem parameter)

The LOB\_INLINE\_LENGTH subsystem parameter specifies the default length (in bytes) that is to be used for inline LOB columns.

An *inline LOB* is the portion of a LOB column that resides in the containing table's base table space rather than in the column's auxiliary table space. The value in this field is used when the INLINE LENGTH option is not specified in the definition of a LOB column in a CREATE TABLE or ALTER TABLE ADD statement.

Acceptable values:	0 to 32680
Default:	0
Update:	option 8 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP LOB_INLINE_LENGTH

When you enter a value in this field, keep the following points in mind:

- A value of 0 causes LOB columns to be created with no inline attribute by default.
- Odd values are rounded to the next even integer for any DBCLOB column created. For example, if you enter 1023, then 1024 bytes of data for new DBCLOB columns reside in the base table.
- The value of this parameter is in bytes, regardless of the LOB column's data type or subtype.

### Related tasks:

[🔗 Improving performance for LOB data \(DB2 Performance\)](#)

### Related reference:

[🔗 CREATE TABLE \(DB2 SQL\)](#)

[🔗 ALTER TABLE \(DB2 SQL\)](#)

## USER LOB VALUE STG field (LOBVALA subsystem parameter)

The LOBVALA subsystem parameter controls the maximum amount of storage, in KB, that each user is to have for storing LOB values.

Acceptable values:	1 to 2097152
Default:	10240
Update:	option 8 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP LOBVALA

## SYSTEM LOB VAL STG field (LOBVALS subsystem parameter)

The LOBVALS subsystem parameter sets an upper limit, in MB, for the amount of memory per system that is to be used for storing LOB values.

Acceptable values:	1 to 51200
Default:	2048
Update:	option 8 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP LOBVALS

## USER XML VALUE STG field (XMLVALA subsystem parameter)

The XMLVALA subsystem parameter specifies, in KB, an upper limit for the amount of storage that each user is to have for storing XML values.

Acceptable values:	1 to 2,097,152 KB
Default:	204,800 KB
Update:	option 8 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP XMLVALA

## SYSTEM XML VALUE STG field (XMLVALS subsystem parameter)

The XMLVALS subsystem parameter specifies, in MB, an upper limit for the amount of storage that each system can use for storing XML values.

Acceptable values:	1 to 51200 MB
Default:	10240 MB
Update:	option 8 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP XMLVALS

---

## DSNTIP7: Sizes panel 2

The first two entries on the DSNTIP7 panel define default values for the system-required objects that DB2 creates automatically. DB2 uses these options for any indexes or table spaces that it implicitly creates. The remaining fields provide general default settings for creating table spaces.

```
DSNTIP7          INSTALL DB2 - SIZES PANEL 2
====>  _

Enter options for implicitly-created table spaces and indexes:
 1 DEFINE DATA SETS      ====> YES      When creating implicit table space
 2 USE DATA COMPRESSION  ====> NO       When creating implicit table space

Enter general options for table spaces below:
 3 TABLE SPACE ALLOCATION  ====> 0       Default space allocation in KB for
                                         table spaces
                                         (0 for DB2 default or 1-4194304)
 4 INDEX SPACE ALLOCATION  ====> 0       Default space allocation in KB for
                                         index spaces
                                         (0 for DB2 default or 1-4194304)
 5 VARY DS CONTROL INTERVAL  ====> YES   Optimize VSAM CONTROL INTERVAL to
                                         page size for data set allocation
 6 OPTIMIZE EXTENT SIZING  ====> YES     Use sliding secondary quantity
                                         for DB2-managed data sets
 7 REORDERED ROW FORMAT    ====> ENABLE  Use RRF by default when creating
                                         table spaces
 8 DEFAULT PARTITION SEGSIZE====> 32    For explicitly-created table spaces
                                         (0, 4, 8, 12, ..., 56, 60, or 64)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 24. Sizes panel 2: DSNTIP7

## DEFINE DATA SETS field (IMPDSDEF subsystem parameter)

The IMPDSDEF subsystem parameter specifies whether DB2 is to define the underlying data set for certain implicitly created table spaces and indexes.

This parameter applies to:

- Base table spaces
- Index spaces of indexes that are implicitly created on base tables
- Implicitly created LOB or XML table spaces
- Auxiliary indexes
- Node ID indexes
- Document ID indexes

Acceptable values: YES, NO  
Default: YES  
Update: option 9 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP IMPDSDEF

**YES** Underlying data sets are defined when the table space or index space is created. This is the default setting.

**NO** Underlying data sets are defined when data is first inserted into the table or index.

However, if all of the following conditions are met, underlying data sets are defined when the table space or index space is created:

- The table contains an LOB column.
- The table is in a clone relationship.
- The containing table space is a partition-by-growth table space.

## **USE DATA COMPRESSION field (IMPTSCMP subsystem parameter)**

The IMPTSCMP subsystem parameter determines whether a table space that is created in an implicitly created database is to use data compression.

Acceptable values: NO, YES  
Default: NO  
Update: option 9 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP IMPTSCMP

**NO** Disables data compression. This is the default value.

**YES** Enables data compression for table spaces that are created in implicitly created databases.

The value of the USE DATA COMPRESSION field applies only to implicitly created base table spaces. It is not used for implicitly created LOB or XML table spaces.

## **TABLE SPACE ALLOCATION field (TSQTY subsystem parameter)**

The TSQTY subsystem parameter specifies the amount of space in KB that is to be allocated for primary and secondary spaces. This parameter applies to DB2-defined data sets for table spaces that are created without the PRIQTY and SECQTY clauses.


Acceptable values: 0 to 4194304  
Default: 0

Update: option 9 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP TSQTY

A value of 0 indicates that DB2 is to use a default value of 1 cylinder for a non-LOB table space or 10 cylinders for a LOB table space.

In a data sharing environment, this parameter has group scope.

**Related concepts:**

 How SQL statements are invoked (DB2 SQL)

## INDEX SPACE ALLOCATION field (IXQTY subsystem parameter)

The IXQTY subsystem parameter controls the amount of space in KB that is to be allocated for primary and secondary spaces. This parameter applies to DB2-defined data sets for index spaces that are created without the PRIQTY and SECQTY clauses.

Acceptable values: 0 to 4194304  
Default: 0  
Update: option 9 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP IXQTY

A value of 0 indicates that DB2 is to use a default allocation of one cylinder.

In a data sharing environment, this parameter has group scope.

## VARY DS CONTROL INTERVAL field (DSVCI subsystem parameter)

The DSVCI subsystem parameter controls whether DB2-managed data sets that are created by CREATE TABLESPACE or CREATE INDEX statements are to have variable VSAM control intervals.

Acceptable values: YES, NO  
Default: YES  
Update: option 9 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP DSVCI

**YES** DB2 creates DB2-managed data sets for table spaces and index spaces. The DB2-managed data sets have a VSAM control interval that corresponds to the buffer pool that is used for the table space or index space.

**NO** DB2-managed data sets are created with a fixed control interval of 4 KB, regardless of the buffer pool size.

This parameter is online-updatable. If you change this value from NO to YES, any pre-existing or migrated data sets remain in 4 KB control intervals until they are redefined. If you change this value from YES to NO, any pre-existing or migrated data sets in 8 KB, 16 KB, or 32 KB control intervals remain in those control intervals until they are redefined. You can explicitly redefine a data set. In addition, data sets are implicitly redefined by utilities such as LOAD REPLACE, REORG TABLESPACE, or RECOVER.

## OPTIMIZE EXTENT SIZING field (MGEXTSZ subsystem parameter)

The MGEXTSZ subsystem parameter controls whether secondary extent allocations for DB2-managed data sets are to be sized according to a sliding scale. Sizing the secondary extents on a sliding scale optimizes the likelihood of reaching the maximum data set size before secondary extents are exhausted.

Acceptable values:	YES, NO
Default:	YES
Update:	option 9 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP MGEXTSZ

**YES** DB2 automatically optimizes the secondary extent allocations of data sets for table spaces and index spaces that have a SECQTY value of greater than zero. When all secondary extents are exhausted for the first data set of a nonpartitioned table space or a nonpartitioned index space that has a SECQTY value of greater than zero, the primary space allocation of each subsequent data set is the larger of the SECQTY setting and the value that is derived from the sliding scale algorithm.

**NO** Secondary extent allocations are managed manually. For nonpartitioned table spaces and nonpartitioned index spaces, when all extents of the first data set are exhausted, the primary space allocation of each subsequent data set is always the PRIQTY setting.

When the sliding scale is used, secondary extent allocations that are allocated earlier are smaller than those allocated later, until a maximum allocation is reached. The maximum allocation is 127 cylinders for data sets with a maximum size of 16 GB or less, and 559 cylinders for data sets with a maximum size of 32 GB or 64 GB.

Secondary extent allocations for data sets in implicitly created table spaces are not influenced by this setting because they always use the sliding scale.

**In migration mode**, the input migration value for this field is overridden to YES, so you need to reset it to NO if you want to continue to disable secondary extent optimization.

## REORDERED ROW FORMAT field (RRF subsystem parameter)

The value of this parameter specifies whether most newly created table spaces are to store data in reordered row format (RRF) or basic row format (BRF) by default.

Acceptable values:	ENABLE, DISABLE
Default:	ENABLE
Update:	option 9 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RRF

### **ENABLE**

Newly created table spaces or newly added partitions that are created by ALTER ADD PARTITION statements on partition-by-growth table spaces will be created in RRF. Existing BRF table spaces will be converted to RRF by running LOAD REPLACE or REORG TABLESPACE.

### **DISABLE**

Newly created table spaces, including universal table spaces, and newly added

partitions that are created by ALTER ADD PARTITION statements on partition-by-growth table spaces will be created in BRF. Existing BRF table spaces will not be converted to RRF by LOAD REPLACE or REORG TABLESPACE.

The following additional restrictions apply, regardless of the setting of the REORDERED ROW FORMAT field:

- Newly created partitions for existing BRF table spaces that contain tables with an EDITPROC will always be in BRF format.
- XML table spaces will always be in RRF.
- Existing RRF table spaces will never be converted to BRF by LOAD REPLACE or REORG TABLESPACE except when requested explicitly with the ROWFORMAT keyword.
- Universal table spaces that are involved in a CLONE relationship will never be converted from BRF to RRF or from RRF to BRF by LOAD REPLACE or REORG TABLESPACE, regardless of the subsystem parameter or utility keyword setting.

## DEFAULT PARTITION SEGSIZE field (DPSEGSZ subsystem parameter)

The DPSEGSZ subsystem parameter specifies the default segment size that is to be used for partitioned table spaces when the CREATE TABLESPACE statement does not include the SEGSIZE parameter.

Acceptable values: 0, 4, 8, 12, ..., 60, 64 ( multiples of 4)  
 Default: 32  
 Update: option 9 on panel DSNTIPB  
 DSNZPxxx: DSN6SYSP.DPSEGSZ

The type of table space that is created depends on whether the CREATE TABLESPACE statement specifies the MAXPARTITIONS and NUMPARTS clauses. The following table shows the relationship among the DPSEGSZ subsystem parameter, the MAXPARTITIONS and NUMPARTS clauses, and the type of table space that is created by the CREATE TABLESPACE statement.

*Table 47. Effect of DPSEGSZ subsystem parameter, MAXPARTITIONS clause, and NUMPARTS clause on the type of table space that is created*

DPSEGSZ setting	MAXPARTITIONS clause	NUMPARTS clause	Type of table space created
0	not specified	not specified	segmented table space with SEGSIZE 4
0	not specified	specified	partitioned (non-universal)table space
0	specified	not specified	partition-by-growth table space with SEGSIZE 32
0	specified	specified	partition-by-growth table space with SEGSIZE 32

Table 47. Effect of DPSEGSZ subsystem parameter, MAXPARTITIONS clause, and NUMPARTS clause on the type of table space that is created (continued)

DPSEGSZ setting	MAXPARTITIONS clause	NUMPARTS clause	Type of table space created
$n > 0$	not specified	not specified	segmented table space with SEGSIZE 4
$n > 0$	not specified	specified	range-partitioned table space with SEGSIZE $n$
$n > 0$	specified	not specified	partition-by-growth table space with SEGSIZE $n$
$n > 0$	specified	specified	partition-by-growth table space with SEGSIZE $n$

The DPSEGSZ subsystem parameter has no effect on the creation of segmented table spaces and implicitly created table spaces. The table above includes segmented table spaces for completeness.

## DSNTIP9: Work file database panel

The fields on the DSNTIP9 panel configure the 4 KB and 32 KB page size table spaces in the DB2 work file database.

The values in these fields determine the following:

- The total amount of space that is available for each type of table space.
- The number of table spaces that are to be created during the installation or migration process for each type of table space. In INSTALL mode, you must specify at least 1 for each of the 4 types of work file table spaces: 4 KB sort work, 32 KB sort work, 4 KB temporary work, and 32 KB temporary work. In MIGRATE mode, you can specify 0 for any or all of these table spaces.
- The segment size of each type of table space. You can change the segment size in installation mode or if you are migrating from DB2 9.
- The maximum amount of temporary storage in the work file database that a single agent can use at any given time for any type of usage. The usage can be for sort work files, created global temporary tables, declared global temporary tables, scrollable cursors result tables, and so on.

The settings on this panel are used to tailor installation job DSNTIJTM, which creates the work file database. For more information about job DSNTIJTM, see “Installation step 16: Create default storage group, define temporary work files, and bind DB2 REXX Language Support: DSNTIJTM” on page 535. To determine the storage requirements for work file database table spaces, see Work file database storage requirements.

Sort work table space in the work file database are used as temporary space for SQL statements and triggers that require working storage. In particular, this includes statements that use the following types of operations:

- GROUP BY or HAVING (without index)
- ORDER BY (without index)



- DISTINCT (without index)
- UNION (except UNION ALL)
- EXISTS (subselect)
- ANY (subselect)
- SOME (subselect)
- ALL (subselect)
- Some joins

**From V8** Beginning in DB2 9, the work file database is also used by declared global temporary tables and for static scrollable cursor implementation, which used the TEMP database in previous versions. If you are migrating from DB2 Version 8 and created a TEMP database in a previous version of DB2, it is not used in DB2 10. You can drop it anytime after completing migration to DB2 10 conversion mode from Version 8. If you drop it before entering new-function mode, you need to re-create it if you fall back to DB2 Version 8. **From V8**

Temporary work table spaces in the work file database are used for declared global temporary tables. They can increase in size beyond the primary allocation. When the value of the INSTALL TYPE field is INSTALL, temporary work table spaces are created as either partition-by-growth or segmented table spaces, depending on the amount of primary space per table space.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

You can add a work file table space or change the size of an existing one by deleting and redefining it. DB2 needs to be started for these activities and you do not need to stop the work file database. All DB2 users share the work file database table spaces. You cannot use utilities on the work file database table spaces.

You can create additional work file table spaces at any time, including during migration. Creating additional work file table spaces can improve DB2 performance by reducing device contention among applications that require working storage.

For the work file database, the maximum number of data sets per table space is 32, and the maximum size of a data set is 2 GB in conversion mode (from both Version 8 and Version 9).

As of DB2 10 new-function mode, the work file database can contain partition-by-growth table spaces to increase the available space for declared global temporary tables and reduce the possibility of receiving SQLCODE -904. A partition-by-growth table space can grow up to 128 TB. The maximum number of partitions to which the partition-by-growth table space can grow and the maximum size of the table space are determined by the MAXPARTITIONS and DSSIZE values that are specified for the table space.

**Recommendation:** After migration to DB2 10 new-function mode, drop work file table spaces and re-create them as partition-by-growth table spaces. (Existing table spaces cannot be altered to become partition-by-growth table spaces.)

**Updating the parameters:** You can alter the characteristics of the DB2 catalog, directory, work file databases, BSDS, and active and archive logs by using the

methods described on Updating subsystem parameter and application default values. You can change only the value of MAX TEMP STG/AGENT directly on the panel.

```


DSNTIP9          INSTALL DB2 - WORK FILE DATABASE
====>

Enter options for creating sort work table spaces:
 1 4K SORT PRIMARY SPACE ====> 20      Total primary space (MB)
 2 4K SORT WORK TS'S    ====> 1        Number of table spaces to create
 3 4K SORT WORK SEG SIZE ====> 16      Segment size
 4 32K SORT PRIMARY SPACE====> 20      Total primary space (MB)
 5 32K SORT WORK TS'S   ====> 1        Number of table spaces to create
 6 32K SORT WORK SEG SIZE====> 16      Segment size
Enter options for creating temporary (DGTT) work file table spaces:
 7 4K TEMP PRIMARY SPACE ====> 20      Total primary space (MB)
 8 4K TEMP WORK TS'S    ====> 1        Number of table spaces to create
 9 4K TEMP WORK SEG SIZE ====> 16      Segment size
10 32K TEMP PRIMARY SPACE====> 20      Total primary space (MB)
11 32K TEMP WORK TS'S   ====> 1        Number of table spaces to create
12 32K TEMP WORK SEG SIZE====> 16      Segment size
Enter other work file database options:
13 MAX TEMP STG/AGENT   ====> 0        Maximum MB of temp storage per agent
14 SEPARATE WORK FILES  ====> NO       Separate work according to TS type
15 MAX TEMP RID         ====> NOLIMIT   Max RID blocks of temp storage per
                                         RID list (NOLIMIT, NONE, 1 -329166)
PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 25. Work file database panel: DSNTIP9

#### Related tasks:

 [Creating additional work file table spaces to reduce contention \(DB2 Performance\)](#)

## 4K SORT PRIMARY SPACE field

The value of the 4K SORT PRIMARY SPACE field specifies the total amount of space for all 4 KB sort work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

Acceptable values:	for installation: 1 to 32,702,464; for migration: 0 to 32,702,464
Default:	for installation: 20; for migration: 0
Update:	none
DSNZPxxx:	none

The value of the 4K SORT PRIMARY SPACE field is divided by the value of the 4K SORT WORK TS'S field to determine the primary space quantity (PRIQTY) for creating each 4 KB type sort work file table space. For example, if you specify a value of 16 for the 4K SORT PRIMARY SPACE field and a value of 4 for the 4K SORT WORK TS'S field, the PRIQTY for each 4 KB type table space is 4096 KB.

The secondary space quantity (SECQTY) value for each 4 KB type table space is always 0.

If you run the CLIST in MIGRATE mode, the value of the 4K SORT PRIMARY SPACE field is used only when additional 4 KB type sort work file table spaces are created. DB2 does not take into account the space that is already used by existing 4 KB type work files.

## 4K SORT WORK TS'S field

The value of the 4K SORT WORK TS'S field specifies the number of 4 KB sort work file table spaces that are to be created.

Acceptable values:	for installation: 1 to 499; for migration: 0 to 500
Default:	for installation: 1 for migration: 0
Update:	none
DSNZPxxx:	none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used for creating new 4 KB type sort work file table spaces. DB2 does not take into account the number of existing 4 KB type sort work file table spaces.

## 4K SORT WORK SEG SIZE field

The value of the 4K SORT WORK SEG SIZE field specifies the segment size that is to be used for 4 KB sort work file table spaces. The value must be a multiple of 4 between 4 and 64, inclusive.

Acceptable values:	4, 8, 12, ..., 60, 64 (multiples of 4)
Default:	16
Update:	none
DSNZPxxx:	none

### From V8

If you are migrating from Version 8, the value of the 4K SORT WORK SEG SIZE field is always set to 16 and cannot be changed.

### From V8

The value of the 4K SORT WORK SEG SIZE field does not apply to existing 4 KB work file table spaces.

## 32K SORT PRIMARY SPACE field

The value of the 32K SORT PRIMARY SPACE field specifies the total amount of space for all 32 KB sort work table spaces in the work file database. This value is specified in MB but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

Acceptable values:	for installation: 1 to 32,702,464; for migration: 0 to 32,702,464
Default:	for installation: 20; for migration: 0

Update: none  
DSNZPxxx: none

The value of the 32K SORT PRIMARY SPACE field is divided by the value of the 32K SORT WORK TS'S field to determine the primary space quantity (PRIQTY) for creating each 32 KB type sort work file table space. For example, if you specify a value of 16 for the 32K SORT PRIMARY SPACE field and a value of 4 for the 32K SORT WORK TS'S field, the PRIQTY for each 32 KB type table space is 4096 KB.

The secondary space quantity (SECQTY) value for each 32 KB type table space is always 0.

If you run the CLIST in MIGRATE mode, the value of the 32K SORT PRIMARY SPACE field is used only when additional 32 KB type sort work file table spaces are created. DB2 does not take into account the space that is already used by existing 32 KB type work files.

### 32K SORT WORK TS'S field

The value of the 32K SORT WORK TS'S field specifies the number of 32 KB sort work file table spaces that are to be created.

Acceptable values: for installation: 1 to 499; for migration: 0 to 500  
Default: for installation: 1 for migration: 0  
Update: none  
DSNZPxxx: none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used for creating new 32 KB type sort work file table spaces. DB2 does not take into account the number of existing 32 KB type sort work file table spaces.

### 32K SORT WORK SEG SIZE field

The value of the 32K SORT WORK SEG SIZE field specifies the segment size that is to be used for 32 KB sort work file table spaces. The value must be a multiple of 4 between 4 and 64, inclusive.

Acceptable values: 4, 8, 12, ..., 60, 64 (multiples of 4)  
Default: 16  
Update: none  
DSNZPxxx: none

**From V8**

If you are migrating from Version 8, the value of the 32K SORT WORK SEG SIZE field is always set to 16 and cannot be changed.

**From V8**

The value of the 32K SORT WORK SEG SIZE field does not apply to existing 32 KB work file table spaces.

## 4K TEMP PRIMARY SPACE field

The value of the 4K TEMP PRIMARY SPACE field specifies the total amount of space for all 4 KB temporary work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike sort work table spaces, temporary work table spaces can increase in size beyond the primary allocation. In installation mode, temporary work table spaces, unlike sort work table spaces, are created as either partition-by-growth table spaces or segmented table spaces, depending on the amount of primary space per table space.

Acceptable values:	for installation: 1 to 8,388,608,000; for migration: 0 to 32,702,464
Default:	for installation: 20; for migration: 0
Update:	none
DSNZPxxx:	none

The value of the 4K TEMP PRIMARY SPACE field is divided by the value of the 4K TEMP WORK TS'S field to determine either of the following values:

- The primary space quantity (PRIQTY)
- The maximum number of partitions (MAXPARTITIONS) and the maximum size (DSSIZE) of each partition

The PRIQTY value is used for creating each 4 KB type temporary work table space as a segmented table space. The MAXPARTITIONS and DSSIZE values are used for creating each 4 KB type temporary work table space as a partition-by-growth table space.

In migration mode, only segmented table spaces can be created in the work file database. The value of the 4K TEMP PRIMARY SPACE field is used only when additional 4 KB type work file table spaces are created. DB2 does not take into account the space that is already used by existing 4 KB type work files. If necessary, the CLIST curtails the calculated space at 64 GB, which is the maximum for a 4 KB page size segmented table space.

In installation mode, when there is 1 GB or less per table space, segmented table spaces are created by using the PRIQTY parameter. Otherwise, partition-by-growth table spaces are created by using the DSSIZE and MAXPARTITIONS parameters. If necessary, the CLIST curtails the calculated space at 16,384 GB, which is the maximum for a 4 KB page size partition-by-growth table space.

For example:

- In either installation or migration mode, if you specify a value of 16 for the 4K TEMP PRIMARY SPACE field and a value of 4 for the 4K TEMP WORK TS'S field, the PRIQTY for each 4 KB type table space is 4096 KB.
- In installation mode, if you specify a value of 16G for the 4K TEMP PRIMARY SPACE field and a value of 4 for the 4K TEMP WORK TS'S field, the MAXPARTITIONS for each 4 KB type table space is 1 with a DSSIZE of 4.

- If you run the CLIST in INSTALL mode, and you specify a value of 16G for the 4K TEMP PRIMARY SPACE field and a value of 4 for the 4K TEMP WORK TS'S field, the PRIQTY for each 4 KB type table space is 4,194,304 KB.

## 4K TEMP WORK TS'S field

The value of the 4K TEMP WORK TS'S field specifies the number of 4 KB temporary work file table spaces that are to be created.

Acceptable values:	for installation: 1 to 499; for migration: 0 to 500
Default:	for installation: 1; for migration: 0
Update:	none
DSNZPxxx:	none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used when new 4 KB type temporary work file table spaces are created. DB2 does not take into account the number of existing 4 KB type temporary work file table spaces.

## 4K TEMP WORK SEG SIZE field

The value of the 4K TEMP WORK SEG SIZE field specifies the segment size that is to be used for 4 KB temporary work file table spaces. The value must be a multiple of 4 between 4 and 64, inclusive.

Acceptable values:	4, 8, 12, ..., 60, 64 (multiples of 4)
Default:	16
Update:	none
DSNZPxxx:	none

### From V8

If you are migrating from Version 8, the value of the 4K TEMP WORK SEG SIZE field is always set to 16 and cannot be changed. The value of the field does not affect existing 4 KB temporary work file table spaces.

### From V8

## 32K TEMP PRIMARY SPACE field

The value of the 32K TEMP PRIMARY SPACE field specifies the total amount of space for all 32 KB temporary work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike sort work table spaces, temporary work table spaces can increase in size beyond the primary allocation. In installation mode, temporary work table spaces, unlike sort work table spaces, are created as either partition-by-growth or segmented table spaces, depending on the amount of primary space per table space.

Acceptable values:	for installation: 1 to 67,108,864,000; for migration: 0 to 32,702,464
Default:	for installation: 20; for migration: 0
Update:	none
DSNZPxxx:	none

The value of the 32K TEMP PRIMARY SPACE field is divided by the value of the 32K TEMP WORK TS'S field to determine either of the following values:

- The primary space quantity (PRIQTY)
- The maximum number of partitions (MAXPARTITIONS) and the maximum size (DSSIZE) of each partition

The PRIQTY value is used for creating each 32 KB type temporary work table space as a segmented table space. The MAXPARTITIONS and DSSIZE values are used for creating each 32 KB type temporary work table space as a partition-by-growth table space.

If you run the CLIST in MIGRATE mode, only segmented table spaces can be created in the work file database. The value of 32K TEMP PRIMARY SPACE field is used only when additional 32 KB work file table spaces are created. DB2 does not take into account the space that is already used by existing 32 KB work files. If necessary, the CLIST curtails the calculated space at 64 GB, which is the maximum for a 32 KB page size segmented table space.

In installation mode, when there is 1 GB or less per table space, segmented table spaces are created by using the PRIQTY parameter. Otherwise, partition-by-growth table spaces are created using the DSSIZE and MAXPARTITIONS parameters. If necessary, the CLIST curtails the calculated space at 131,072 GB, which is the maximum for a 32 KB page size partition-by-growth table space.

For table spaces that are larger than 16,384 GB, data sets must be associated with a Data Facility Storage Management Subsystem (DFSMS) data class that has been specified with extended format and extended addressability.

For example:

- If you run the CLIST in either INSTALL or MIGRATE mode, if you specify a value of 16 for the 32K TEMP PRIMARY SPACE field and a value of 4 for the 32K TEMP WORK TS'S field, the PRIQTY value for each 32 KB type table space is 4096 KB.
- If you run the CLIST in INSTALL mode, and you specify a value of 16G for the 32K TEMP PRIMARY SPACE field and a value of 4 for the 32K TEMP WORK TS'S field, the MAXPARTITIONS value for each 32 KB type table space is 1 and the DSSIZE is 4.
- If you run the CLIST in MIGRATE mode, and you specify a value of 16G for the 32K TEMP PRIMARY SPACE field, the PRIQTY value for each 32 KB type table space is 4,193,304 KB.

## 32K TEMP WORK TS'S field

The value of the 32K TEMP WORK TS'S field specifies the number of 32 KB temporary work file table spaces that are to be created.

Acceptable values:	for installation: 1 to 499; for migration: 0 to 500
Default:	for installation: 1; for migration: 0

Update: none  
DSNZPxxx: none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in INSTALL mode, you must enter a value of at least 1.

If you run the CLIST in INSTALL mode, and you do not have an existing 32 KB work file table space, enter a non-zero value. If you enter a non-zero value, the value is used for creating new 32 KB type temporary work file table spaces. DB2 does not take into account the number of existing 32 KB type temporary work file table spaces.

### 32K TEMP WORK SEG SIZE field

The value of the 32K TEMP WORK SEG SIZE field specifies the segment size that is to be used for 32 KB temporary work file table spaces. The value must be a multiple of 4 between 4 and 64, inclusive.

Acceptable values: 4, 8, 12, ..., 60, 64 (multiples of 4)  
Default: 16  
Update: none  
DSNZPxxx: none

#### From V8

If you are migrating from Version 8, the value of the 32K TEMP WORK SEG SIZE field is always set to 16 and cannot be changed. The value of 32K TEMP WORK SEG SIZE field does not affect existing 32 KB work file table spaces.

#### From V8

### MAX TEMP STG/AGENT field (MAXTEMPS subsystem parameter)

The MAXTEMPS subsystem parameter determines the maximum amount of temporary storage in the work file database that a single agent can use at any given time for any type of usage. The usage can be for sort work files, created global temporary tables, declared global temporary tables, scrollable cursors result tables, and so on.

Acceptable values: 0 to 2147483647  
Default: 0  
Update: option 10 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM MAXTEMPS

An entry of 0 means that no limit is enforced.

By default, the specified value for MAXTEMPS is in MB, and in job DSNTIJUZ, the parameter value must be specified in MB. However, you can enter a GB value in the MAX TEMP STG/AGENT field of the installation CLIST by specifying a suffix of G, for example 4G.



## SEPARATE WORK FILES field (WFDBSEP subsystem parameter)

The WFDBSEP subsystem parameter specifies whether DB2 should provide an unconditional separation of table spaces in the work file database based on the allocation attributes of the table spaces.

Acceptable values:	YES, NO
Default:	NO
Update:	option 10 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.WFDBSEP

**YES** DB2 directs declared global temporary table work only to DB2-managed (STOGROUP) work file table spaces that are defined as partition-by-growth (regardless of the SECQTY setting) or segmented (non-universal) table spaces with a non-zero SECQTY setting. DB2 directs work file work only to DB2-managed table spaces that are defined as segmented (non-universal) with a zero SECQTY value or user-managed table spaces. If no table space with the preferred allocation type is available, DB2 issues an error message, a negative SQLCODE, or both.

**NO** DB2 attempts to direct declared global temporary table work to DB2-managed (STOGROUP) work file table spaces that are defined as partition-by-growth (regardless of the SECQTY value). It then attempts to direct the work to segmented (non-universal) table spaces with a non-zero SECQTY value. DB2 attempts to direct work file work to DB2-managed table spaces that are defined as segmented (non-universal) with a zero SECQTY value or user-managed table spaces. If no table space with the preferred allocation type is available, DB2 selects a table space with a non-preferred allocation type.

## MAX TEMP RID field (MAXTEMPS\_RID subsystem parameter)

The MAXTEMPS\_RID subsystem parameter determines the maximum amount of temporary storage in the work file database that a single RID list can use at a time.

The work file storage is used for the RID list when the RID pool storage cannot be used to contain all the RIDs. In other words, when RID pool storage overflow occurs for a RID list, the DB2 subsystem attempts to store the RID list in work file storage instead of falling back to a relational scan. This subsystem parameter specifies the maximum number of RIDs (measured in RID blocks) that the subsystem is allowed to store in the work file. If the maximum number of RIDs is exceeded, the subsystem falls back to a relational scan.

The MAXTEMPS\_RID subsystem parameter does not affect RID list processing for pair-wise join.

Acceptable values:	NONE, NOLIMIT, or 1 to 329166
Default:	NOLIMIT
Update:	option 10 on panel DSNTIPB
DSNZPxxx:	MAXTEMPS_RID

The MAXTEMPS\_RID value is specified in number of RID blocks. An entry of NONE means that the RID list processing will not use work file storage. An entry of NOLIMIT means that the number of RID blocks that can be stored in a work file is unrestricted. This is the default behavior.


Each RID block that is stored in the work file occupies 32 KB of work file storage and contains 6524 RIDs. For example, a value of 10000 for MAXTEMPS\_RID limits the number of RIDs that are allowed to be stored in the work file to 65,240,000, or approximately 312.5 MB.

Another subsystem parameter, MAXTEMPS, controls the maximum amount of temporary storage in the work file database that a single agent can use at a time for any type of usage. The scope of the parameter includes work file usage for storing RIDs. Therefore, if MAXTEMPS is set to a non-zero value, it overrides the setting of MAXTEMPS\_RID in some cases.

For example, consider the following scenario:

MAXTEMPS is set to 2G, meaning that 2 GB of work file storage is allowed to be used by the agent. MAXTEMPS\_RID is set to 20000, meaning that 20,000 RID blocks are allowed to be stored in a work file, which translates to 625 MB of work file storage. Suppose that a RID list processing encountered a RID pool overflow, and therefore, the DB2 subsystem is using work file storage to store the RID list. Suppose that 104,384,000 RIDs are fetched into the RID list. The list therefore, takes up 16,000 RID blocks, which is below the MAXTEMPS\_RID value of 20000. If no other activity is using much work file storage in the agent, the RID list should be successfully stored in a work file, and RID processing could continue. However, if other activities in the agent are using more than 1.5 GB of work file storage, less than 500 MB of work file storage is available to the agent (MAXTEMPS - 1.5 GB). The 16,000 RID blocks cannot fit in the 500 MB of available space. RID processing will not have enough work file storage and will fall back to a relational scan although the MAXTEMPS\_RID value is well above the amount that the RID list needs.

**Related tasks:**

 [Managing RID pool size \(DB2 Performance\)](#)

**Related reference:**

RID POOL SIZE field (MAXRBLK subsystem parameter)

MAX TEMP STG/AGENT field (MAXTEMPS subsystem parameter)

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## DSNTIPE: Thread management panel

The entries on the DSNTIPE panel determine main storage sizes.

*Updating the parameters:* You can use the UPDATE mode of the CLIST to update any value on this panel.

```

DSNTIPE          INSTALL DB2 - THREAD MANAGEMENT
====> _
Check numbers and reenter to change:

 1 DATABASES          ===> 200      Concurrently in use
 2 MAX USERS          ===> 200      Concurrently running in DB2
 3 MAX REMOTE ACTIVE   ===> 200      Maximum number of active
                                     database access threads
 4 MAX REMOTE CONNECTED ===> 10000    Maximum number of remote DDF
                                     connections that are supported
 5 MAX TSO CONNECT     ===> 50       Users on QMF or in DSN command
 6 MAX BATCH CONNECT   ===> 50       Users in DSN command or utilities
 7 MAX KEPT DYN STMTS  ===> 5000    Maximum number of prepared dynamic
                                     statements saved past commit points
 8 CONTRACT THREAD STG ===> YES     Periodically free unused thread stg
 9 MANAGE THREAD STORAGE ===> NO     Manage thread stg to minimize size
10 LONG-RUNNING READER ===> 10     Minutes before read claim warning
11 PAD INDEXES BY DEFAULT ===> NO     Use PADDED for new indexes
12 MAX OPEN FILE REFS  ===> 100     Maximum concurrent open data sets

PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 26. Thread management panel: DSNTIPE


## DATABASES field for panel DSNTIPE

The value of the DATABASES field of panel DSNTIPE indicates the maximum number of databases that are to be open at one time.

Acceptable values:	1 to 800
Default:	200
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	none

The maximum number of concurrent databases is affected primarily by the DSMAX field on panel DSNTIPC, which specifies the maximum number of open data sets.

### Related tasks:

 Programming applications for performance (DB2 Performance)

### Related reference:

DSMAX field (DSMAX subsystem parameter)

## MAX USERS field (CTHREAD subsystem parameter)

The CTHREAD subsystem parameter controls the maximum number of allied threads that are to be allocated concurrently. *Allied threads* are threads that are started at the local subsystem.

Acceptable values:	1 to 20000
Default:	200
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP CTHREAD

Count each of the following items as separate users:

- Each TSO user (whether running a DSN command or a DB2 request from QMF)
- Each batch job (whether running a DSN command or a DB2 utility)

- Each IMS region that can access DB2
- Each active CICS transaction that can access DB2
- Each utility (each utility uses one thread, plus one thread for each subtask)
- Each connection from users of CAF and RRSAF
- Each WebSphere application server or other application server that uses JDBC or ODBC has multiple connections to DB2. The number of connections is determined by the application server.

The maximum number of threads accessing data that can be allocated concurrently is the sum of the value of the MAX USERS field and the MAX REMOTE ACTIVE field on panel DSNTIPE. The maximum allowable value for this sum is 20000. When the number of users who are attempting to access DB2 exceeds the number that you specify, excess plan allocation requests are queued. In most situations, the amount of real storage determines the maximum number of threads that DB2 can handle.

Due to parallelism, DB2 utilities each use a minimum of one thread, plus an additional thread for each subtask. Therefore, a single utility might use many threads. Specify a thread value accordingly to accommodate parallelism within utilities. Consider using a value that is higher than the default value or the value that you specified in a previous version of DB2.

## MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

Acceptable values:	0 to 19999
Default:	200
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP MAXDBAT

The total number of threads accessing data concurrently is the sum of the value of the MAX USERS field and this field, MAX REMOTE ACTIVE. The maximum allowable value for this sum is 20000. If a request for a new connection to DB2 is received and MAX REMOTE ACTIVE has been reached, the resulting action depends on whether ACTIVE or INACTIVE is specified for the DDF THREADS field on panel DSNTIPR.

If DDF THREADS is ...	Action taken is ...
ACTIVE	The allocation request is allowed but any further processing for the connection is queued waiting for an active database access thread to terminate.
INACTIVE	The allocation request is allowed and is processed when DB2 can assign an unused database access thread slot to the connection.

## Setting MAX REMOTE ACTIVE to 0

You can use a 0 in this field to restrict DDF server activity on a member of a data sharing group. A setting of 0 produces the following results:

- DDF does not register the member with WLM for member-specific Sysplex routing. This does not prevent the member from using WLM for enclave prioritization, but it prevents WLM from including this member in the Sysplex routing data that is sent to remote sites.
- In an SNA network, DDF does not register the member's LU name with the VTAM generic LU name during DDF startup. This causes VTAM generic resource connections to be directed to DB2 members that specify a MAX REMOTE ACTIVE value of greater than 0.
- In a TCP/IP network, DDF does not listen on the DRDA SQL port. This means TCP/IP SQL connections can be accepted only by members that specify MAX REMOTE ACTIVE greater than 0.
- DDF rejects requests for the Sysplex Routing TPN with the following sense code: SNA TPN not available.
- MAX REMOTE CONNECTED (CONDBAT) will be lowered to zero by default if it is not set explicitly.
- DB2 will still accept inbound Automatic Resynchronization requests.

## MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)

The CONDBAT subsystem parameter sets the maximum number of concurrent inbound DDF connections that are to be allowed.

Acceptable values:	0 to 150000
Default:	10000
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP CONDBAT

This value must be greater than or equal to the value of MAX REMOTE ACTIVE. If MAX REMOTE ACTIVE is set to zero, MAX REMOTE CONNECTED is also set to zero. If a request to allocate a new connection to DB2 is received, and MAX REMOTE CONNECTED has been reached or MAX REMOTE CONNECTED is zero, the connection request is rejected.

### Related tasks:

 Setting thread limits for database access threads (DB2 Performance)

## MAX TSO CONNECT field (IDFORE subsystem parameter)

The IDFORE subsystem parameter determines the maximum number of users that can be identified to DB2 from TSO foreground at the same time.

Acceptable values:	1 to 20000
Default:	50
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP IDFORE

Count each of the following items as a separate user:

- Each TSO foreground user that is executing a DSN command.
- Each TSO foreground user that is connected to DB2 through the CAF or RRSAP. This can include QMF users who are running in TSO foreground or user-written CAF or RRSAP applications running in TSO foreground.

When the number of TSO users who are attempting to access DB2 exceeds the number you specify, excess connection requests are rejected. No DB2 subsystem parameter controls the maximum concurrent connections for IMS and CICS. You can control those limits by using IMS and CICS facilities. For the CICS attachment, the maximum number of connections to DB2 by using the resource control table (RCT) TYPE=INIT THRDMAX value.

## MAX BATCH CONNECT field (IDBACK subsystem parameter)

The IDBACK subsystem parameter determines the maximum number of concurrent connections that can be identified to DB2 from batch.

Acceptable values:	1 to 20000
Default:	50
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP IDBACK

**Recommendation:** Use a minimum setting of 30.

Count each of the following items as a separate connection:

- Each DB2 utility.
- Each batch job that uses QMF.
- Each batch job that uses the DSN command processor.
- Each task that is connected to DB2 through the call attachment facility, which runs in batch. Among others, this can include:
  - Batch jobs that use QMF.
  - TCP/IP FTP connections.
- Each RRSAP connection that runs in batch.
- Each WebSphere application server or other application server that uses JDBC or ODBC has multiple connections to DB2. The number of connections is determined by the application server.

Batch job requests to access DB2 that exceed this limit are rejected.

REBUILD INDEX processing uses DB2 connections and might cause message DSNU397I to be issued. If you receive message DSNU397I indicating the REBUILD INDEX utility is constrained, increase the number of concurrent connections.

## MAX KEPT DYN STMTS field (MAXKEEPD subsystem parameter)

The MAXKEEPD subsystem parameter specifies the maximum number of prepared, dynamic SQL statements that are to be saved past a commit point. This parameter applies to applications that run with the KEEP DYNAMIC(YES) bind option.


Acceptable values:	0 to 65535
Default:	5000
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MAXKEEPD

This is a system-wide limit. This parameter does not limit the size of the dynamic cache itself.


When many applications that are bound with KEEPDPYDYNAMIC(YES) run in a system that has the dynamic statement cache active, they can use a considerable amount of storage in the DBM1 address space. This parameter helps limit the amount of storage that these applications use by limiting the total number of prepared statements held by these applications past a commit point. If this limit is exceeded, DB2 honors the KEEPDPYDYNAMIC(YES) behavior, but "implicit" prepares might be necessary to rebuild the executable version of some SQL statements when they are executed after a commit point.

If you enter 0, DB2 cannot keep the executable version of dynamic SQL statements past commit points. To retain the KEEPDPYDYNAMIC(YES) behavior after a commit point, DB2 implicitly prepares dynamic SQL statements to rebuild the executable version.


**Related concepts:**

 [Methods for keeping prepared statements after commit points \(DB2 Performance\)](#)

**Related tasks:**

 [Minimizing the use of real and virtual storage \(DB2 Performance\)](#)

**Related reference:**

 [KEEPDPYDYNAMIC bind option \(DB2 Commands\)](#)

## **CONTRACT THREAD STG field (CONTSTOR subsystem parameter)**

The CONTSTOR parameter controls whether DB2 is to periodically contract each thread's working storage area. If YES is used, DB2 examines threads at commit points and periodically returns storage that is no longer in use to the operating system. Storage that a thread acquires is normally allocated to that thread until deallocation.

Acceptable values:	YES, NO
Default:	YES
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM CONTSTOR

**Recommendation:** For subsystems that have many long-running threads and that are constrained on storage in the DBM1 address space, specifying YES for this parameter can reduce the total amount of storage that is used in the DBM1 address space. For a subsystem that does not have storage constraints, specify NO for this parameter to achieve optimal performance. If you specify NO, monitor storage usage to ensure that no storage shortage occurs.

## **MANAGE THREAD STORAGE field (MINSTOR subsystem parameter)**

The MINSTOR subsystem parameter controls whether DB2 is to use storage management algorithms that minimize the amount of working storage that is consumed by individual threads.

Acceptable values:	YES, NO
Default:	NO
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MINSTOR


## LONG-RUNNING READER field (LRDRTHLD subsystem parameter)

The LRDRTHLD subsystem parameter specifies the number of minutes that an agent is to be allowed to hold a read claim. If a read claim is held longer than allowed, DB2 issues a warning message, DSNB260I, and writes a trace record to report it as a long-running reader.

Acceptable values:	0 to 1439 minutes
Default:	10
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM LRDRTHLD

If you specify a value of 0, DB2 will not report long-running readers.

### Related information:

 [DSNB260I \(DB2 Messages\)](#)

## PAD INDEXES BY DEFAULT field (PADIX subsystem parameter)

The PADIX subsystem parameter determines whether new indexes are to be padded by default.

Acceptable values:	NO, YES
Default:	NO
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.PADIX


**NO** New indexes will not be padded unless the PADDED option is specified on the CREATE INDEX statement.

This is the default value.

**YES** New indexes will be padded unless the NOT PADDED option is specified on the CREATE INDEX statement.

This parameter affects only indexes that have at least one varying-length column.

### Related concepts:

 [Indexes that are padded or not padded \(Introduction to DB2 for z/OS\)](#)

## MAX OPEN FILE REFS field (MAXOFILR subsystem parameter)

The MAXOFILR subsystem parameter specifies the maximum number of data sets that can be open concurrently for the processing of LOB file references.

Acceptable values:	0 to value specified in MAX USERS field
Default:	100
Update:	option 11 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP MAXOFILR



## DSNTIP1: Buffer pool sizes panel 1

The DSNTIP1 panel is the first of two panels on which you can specify the size of your virtual buffer pools.

**Updating the default buffer pool assignments:** You can also change the default buffer pool assignments for user data on this panel. Objects in the catalog and directory always use the following buffer pools, and the assignments cannot be changed: BP0, BP8K0, BP16K0, and BP32K.

It is best to separate the buffer pools for DB2 catalog and directory from the buffer pools for user data to isolate catalog and directory activities. In most cases, choose buffer pools other than the default buffer pools for user data, user indexes, and work files.

For more information about default buffer pool assignments, see Deciding how many buffer pools to use (DB2 Performance).

**Updating the buffer pool sizes:** You can change your buffer pool sizes online with the ALTER BUFFERPOOL command, but you cannot change these sizes by running the DSNTINST CLIST in update mode.


```
DSNTIP1          INSTALL DB2 - BUFFER POOL SIZES - PANEL 1
====>  _


1 DEFAULT  4-KB BUFFER POOL FOR USER DATA ==> BP0      BP0    - BP49
2 DEFAULT  8-KB BUFFER POOL FOR USER DATA ==> BP8K0    BP8K0  - BP8K9
3 DEFAULT 16-KB BUFFER POOL FOR USER DATA ==> BP16K0   BP16K0 - BP16K9
4 DEFAULT 32-KB BUFFER POOL FOR USER DATA ==> BP32K    BP32K  - BP32K9
5 DEFAULT BUFFER POOL FOR USER LOB DATA  ==> BP0      BP0    - BP32K9
6 DEFAULT BUFFER POOL FOR USER XML DATA  ==> BP16K0   BP16K0 - BP16K9
7 DEFAULT BUFFER POOL FOR USER INDEXES    ==> BP0      BP0    - BP32K9
Enter buffer pool sizes in number of pages.
8 BP0 ==> 20000      18 BP10 ==> 0      28 BP20 ==> 0
9 BP1 ==> 0          19 BP11 ==> 0      29 BP21 ==> 0
10 BP2 ==> 0         20 BP12 ==> 0      30 BP22 ==> 0
11 BP3 ==> 0         21 BP13 ==> 0      31 BP23 ==> 0
12 BP4 ==> 0         22 BP14 ==> 0      32 BP24 ==> 0
13 BP5 ==> 0         23 BP15 ==> 0      33 BP25 ==> 0
14 BP6 ==> 0         24 BP16 ==> 0      34 BP26 ==> 0
15 BP7 ==> 0         25 BP17 ==> 0      35 BP27 ==> 0
16 BP8 ==> 0         26 BP18 ==> 0      36 BP28 ==> 0
17 BP9 ==> 0         27 BP19 ==> 0      37 BP29 ==> 0

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 27. Buffer pool sizes panel 1: DSNTIP1

### Related tasks:

 Assigning database objects to buffer pools (DB2 Performance)  
Calculating buffer pool size

 Monitoring and tuning buffer pools by using online commands (DB2 Performance)

### Related reference:

DSNTIP2: Buffer pool sizes panel 2

 -ALTER BUFFERPOOL (DB2) (DB2 Commands)

## DEFAULT 4-KB BUFFER POOL FOR USER DATA field (TBSBPOOL subsystem parameter)

The TBSBPOOL subsystem parameter specifies the default buffer pool to use for 4 KB page size table spaces that are created implicitly.

Acceptable values:	Any 4 KB buffer pool names
Default:	BP0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBPOOL

If you do not specify a buffer pool name, DB2 uses the TBSBPOOL value as the default buffer pool for 4 KB page size table spaces. DB2 uses the value differently for the following statements:


### CREATE DATABASE

DB2 uses the TBSBPOOL value.

### CREATE TABLE

If you do not specify a table space name, DB2 implicitly creates a table space and selects the buffer pool as described in Implicitly defined table spaces (DB2 Administration Guide).

### Related concepts:

 How SQL statements are invoked (DB2 SQL)

## DEFAULT 8-KB BUFFER POOL FOR USER DATA field (TBSBP8K subsystem parameter)

The TBSBP8K subsystem parameter specifies the default buffer pool to use for 8 KB page size table spaces that are created implicitly.

Acceptable values:	Any 8 KB buffer pool names
Default:	BP8K0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBP8K

If you do not specify a buffer pool name, DB2 uses the TBSBP8K value as the default buffer pool for 8 KB page size table spaces. If you do not specify a table space name for a CREATE TABLE statement, DB2 implicitly creates a table space and selects the buffer pool as described in Implicitly defined table spaces (DB2 Administration Guide).

## DEFAULT 16-KB BUFFER POOL FOR USER DATA field (TBSBP16K subsystem parameter)

The TBSBP16K subsystem parameter specifies the default buffer pool to use for 16 KB page size table spaces that are created implicitly.

Acceptable values:	Any 16 KB buffer pool names
Default:	BP16K0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBP16K

If you do not specify a buffer pool name, DB2 uses the TBSBP16K value as the default buffer pool for 16 KB page size table spaces. If you do not specify a table

space name for a CREATE TABLE statement, DB2 implicitly creates a table space and selects the buffer pool as described in Implicitly defined table spaces (DB2 Administration Guide).

## **DEFAULT 32-KB BUFFER POOL FOR USER DATA field (TBSBP32K subsystem parameter)**

The TBSBP32K subsystem parameter specifies the default buffer pool to use for 32 KB page size table spaces that are created implicitly.

Acceptable values:	Any 32 KB buffer pool names
Default:	BP32K
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBP32K

If you do not specify a buffer pool name, DB2 uses the TBSBP32K value as the default buffer pool for 32 KB page size table spaces. If you do not specify a table space name for a CREATE TABLE statement, DB2 implicitly creates a table space and selects the buffer pool as described in Implicitly defined table spaces (DB2 Administration Guide).

## **DEFAULT BUFFER POOL FOR USER LOB DATA field (TBSBPLOB subsystem parameter)**

The TBSBPLOB subsystem parameter specifies the default buffer pool that is to be used for LOB table spaces that are created implicitly. This parameter also applies to LOB table spaces that are created explicitly without the BUFFERPOOL clause.

Acceptable values:	Any 4 KB, 8 KB, 16 KB, or 32 KB buffer pool names
Default:	BP0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBPLOB

USE privilege is required on the specified buffer pool to use it by default.

### **Related concepts:**

 [How SQL statements are invoked \(DB2 SQL\)](#)

## **DEFAULT BUFFER POOL FOR USER XML DATA field (TBSBPXML subsystem parameter)**

The TBSBPXML subsystem parameter specifies the default buffer pool that is to be used for XML table spaces that are created implicitly.

Acceptable values:	Any 16 KB buffer pool name
Default:	BP16K0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TBSBPXML

USE privilege is required on the specified buffer pool to use it by default.

### **Related concepts:**

 [How SQL statements are invoked \(DB2 SQL\)](#)

## DEFAULT BUFFER POOL FOR USER INDEXES field (IDXBPOOL subsystem parameter)

The IDXBPOOL subsystem parameter identifies the default buffer pool that is to be used for indexes on user data.

DB2 uses the IDXBPOOL value if a value for INDEXBP is not specified on a CREATE DATABASE statement. DB2 does not use this value for a CREATE INDEX statement without the BUFFERPOOL option. In that case, DB2 uses the default index buffer pool for the database.

Acceptable values:	Any 4-KB, 8-KB, 16-KB, or 32-KB buffer pool names
Default:	BP0
Update:	option 12 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP IDXBPOOL

## BUFFERPOOL fields BP0 - BP29

The values of fields BP0 through BP29 on panel DSNTIP1 specify the number of 4 KB buffers in each of those virtual buffer pools (BP0 through BP29).

Acceptable values:	for BP0, 2000 to 250 000 000; for BP1 through BP29, 0 to 250 000 000
Default:	for BP0, 20000; for BP1 through BP29, 0
Update:	ALTER BUFFERPOOL command
DSNZPxxx:	none

**Restriction:** The sum of the storage that is available in all buffer pools cannot exceed 1 TB. The amount of storage configured on the subsystem can further limit the buffer pool sizes. If you specify more storage than the total real storage that is available, performance can suffer.

---

## DSNTIP2: Buffer pool sizes panel 2

The DSNTIP2 panel is the second of the two panels that enables you to specify the size of your virtual buffer pools.

The total size of all buffer pools cannot exceed 1TB.

*Updating the buffer pool sizes:* You can change your buffer pool sizes online with the ALTER BUFFERPOOL command. You cannot change these sizes by running the DSNTINST CLIST in update mode.

```


DSNTIP2          INSTALL DB2 - BUFFER POOL SIZES - PANEL 2
====> -
Enter buffer pool sizes in number of pages.
 1 BP30 ==> 0          18 BP47 ==> 0          35 BP16K4 ==> 0
 2 BP31 ==> 0          19 BP48 ==> 0          36 BP16K5 ==> 0
 3 BP32 ==> 0          20 BP49 ==> 0          37 BP16K6 ==> 0
 4 BP33 ==> 0          21 BP8K0 ==> 2000      38 BP16K7 ==> 0
 5 BP34 ==> 0          22 BP8K1 ==> 0          39 BP16K8 ==> 0
 6 BP35 ==> 0          23 BP8K2 ==> 0          40 BP16K9 ==> 0
 7 BP36 ==> 0          24 BP8K3 ==> 0          41 BP32K  ==> 250
 8 BP37 ==> 0          25 BP8K4 ==> 0          42 BP32K1 ==> 0
 9 BP38 ==> 0          26 BP8K5 ==> 0          43 BP32K2 ==> 0
10 BP39 ==> 0          27 BP8K6 ==> 0          44 BP32K3 ==> 0
11 BP40 ==> 0          28 BP8K7 ==> 0          45 BP32K4 ==> 0
12 BP41 ==> 0          29 BP8K8 ==> 0          46 BP32K5 ==> 0
13 BP42 ==> 0          30 BP8K9 ==> 0          47 BP32K6 ==> 0
14 BP43 ==> 0          31 BP16K0 ==> 500      48 BP32K7 ==> 0
15 BP44 ==> 0          32 BP16K1 ==> 0          49 BP32K8 ==> 0
16 BP45 ==> 0          33 BP16K2 ==> 0          50 BP32K9 ==> 0
17 BP46 ==> 0          34 BP16K3 ==> 0


PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 28. Buffer pool sizes panel 2: DSNTIP2

#### Related tasks:

 Deciding how many buffer pools to use (DB2 Performance)  
Calculating buffer pool size

 Monitoring and tuning buffer pools by using online commands (DB2 Performance)

#### Related reference:

DSNTIP1: Buffer pool sizes panel 1

 `-ALTER BUFFERPOOL (DB2)` (DB2 Commands)

## BUFFERPOOL fields BP30 - BP32K9

The values of fields BP30 through BP32K9 on panel DSNTIP2 specify the number of buffers in each of those virtual buffer pools (BP30 through BP32K9).

Acceptable values:	for BP30 to BP49, 0 to 250 000 000; for BP8K0 to BP8K9, 0 to 125 000 000; for BP16K0 to BP16K9, 0 to 62 500 000; for BP32K, 250 to 31 250 000; for BP32K1 to BP32K9, 0 to 31 250 000
Default:	for BP8K0, 2000; for BP16K0, 500; for BP32K, 250; for all others, 0
Update:	ALTER BUFFERPOOL command
DSNZPxxx:	none

**Restriction:** The sum of the storage that is available in all buffer pools cannot exceed 1 TB. The amount of storage that is configured on the subsystem can further limit the buffer pool sizes.

## DSNTIPN: Tracing parameters panel

The entries on the DSNTIPN panel affect the audit, global, accounting, and monitor traces and the checkpoint frequency.

Because space on this panel is limited, some input fields are not wide enough to display the entire contents of the field at one time. These fields are defined as ISPF scrollable fields, which let you see the field contents. A less-than symbol (<) or a greater-than (>) symbol denotes a scrollable field. A > symbol indicates that the field can be scrolled to the right, and a < symbol indicates that the field can be scrolled to the left. You can position your cursor in the field and use ISPF scroll commands LEFT and RIGHT to scroll through the field. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter. (Alternatively, you can assign your PF keys to be the LEFT, RIGHT, and EXPAND commands.)

```

DSNTIPN          INSTALL DB2 - TRACING PARAMETERS

====> _
Enter data below:


 1  AUDIT TRACE      <====> NO      > Audit classes to start. NO,YES,list
 2  TRACE AUTO START <====> NO      > Global classes to start. YES,NO,list
 3  TRACE SIZE      <====> 64K      Trace table size in bytes. 4K-396K
 4  SMF ACCOUNTING  <====> 1      > Accounting classes to start. NO,YES,list
 5  SMF STATISTICS  <====> YES     > Statistics classes to start. NO,YES,list
 6  STATISTICS TIME <====> 1      Time interval in minutes. 1-60
 7  STATISTICS SYNC <====> NO      Synchronization within the hour. NO,0-59
 8  DATASET STATS TIME <====> 5      Time interval in minutes. 1-60
 9  MONITOR TRACE   <====> NO      > Monitor classes to start. NO,YES,list
10  MONITOR SIZE    <====> 1M      Default monitor buffer size. 1M-64M
11  UNICODE IFCIDS  <====> NO      Include UNICODE data when writing IFCIDS
12  DDF/RRSAF ACCUM <====> 10     Rollup accting for DDF/RRSAF. NO, 2-64K
13  AGGREGATION FIELDS <====> 0      Rollup accting aggregation fields
14  COMPRESS SMF RECS <====> OFF     Compress trace records destined for SMF

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 29. Tracing panel: DSNTIPN

#### Related concepts:

 [DB2 audit trace \(Managing Security\)](#)

### AUDIT TRACE field (AUDITST subsystem parameter)

The AUDITST parameter controls whether the audit trace is to start automatically when DB2 is started. You can specify the classes for which the audit trace is to start.

Acceptable values:	NO, YES, <i>list of classes</i> , an asterisk (*)
Default:	NO
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP AUDITST
Security parameter:	Yes

This is a scrollable field.

**NO** Specifies that there is to be no automatic start of the audit trace. If the audit trace is to be used, it must be started with the START TRACE command.

**YES** Specifies that the audit trace for the default class (class 1) starts whenever DB2 is started.

*list of classes*

Specifies that the audit trace for the specified classes starts whenever DB2 is started. To specify classes, list the numbers (any integer from 1 to 32) separated by commas.


**an asterisk (\*)**

Specifies that the audit trace starts for all classes whenever DB2 is started.

**Note:** This is a security-related parameter. Audit traces should be enabled to collect information about DB2 security controls to ensure that data access is allowed only for authorized users.

**Recommendation:** Either AUDITST or audit policies should be enabled at DB2 startup.

**Related concepts:**

 DB2 audit trace (Managing Security)

## TRACE AUTO START field (TRACSTR subsystem parameter)

The TRACSTR subsystem parameter specifies whether the global trace is to start automatically when DB2 is started. This parameter also specifies the classes for which the global trace is to automatically start.

Acceptable values:	YES, NO, <i>list of classes</i> , an asterisk (*)
Default:	NO
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TRACSTR

This is a scrollable field.

**YES** Starts the global trace for the default classes (classes 1, 2, and 3) whenever DB2 is started, and it performs additional data consistency checks whenever a data or index is modified.

**NO** Specifies no automatic start of the global trace. If the global trace is to be used, it must be started with a special START TRACE command.

*list of classes*


Starts the global trace for the specified classes. Enter a list of class numbers (any integer from 1 to 32) separated by commas. Only classes 1 to 9 are defined by DB2.

**asterisk (\*)**

Starts global trace for all classes.

The global trace is used to diagnose problems in DB2. Users with production systems that require high performance might consider turning off global trace. However, be aware that turning off global trace presents a serviceability exposure. In the event of a system failure, IBM Software Support might request that you turn on global trace and attempt to re-create the problem.

**Related concepts:**

 DB2 audit trace (Managing Security)

**Related tasks:**

 Minimizing the processing cost of DB2 traces (DB2 Performance)

## TRACE SIZE field (TRACTBL subsystem parameter)


The TRACTBL subsystem parameter specifies the size, in bytes, of the RES trace table. This table is the default destination for the global trace records in DB2. Most trace records require 32 byte entries. Events with more than three data items require 64 byte entries.

Acceptable values:	4K to 396K
Default:	64K
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP TRACTBL

You can use the abbreviation K for multiples of 1024 bytes. The actual value is rounded up to a multiple of 4. If you use 50K, for example, the actual table size is 52 KB.

In the subsystem parameter, use a multiple of 4. For example, to get a 64 KB table, code TRACTBL=16.

### Related concepts:

 [DB2 audit trace \(Managing Security\)](#)

## SMF ACCOUNTING field (SMFACCT subsystem parameter)

The SMFACCT subsystem parameter specifies whether DB2 is to send accounting data to SMF automatically when DB2 is started. This parameter also specifies which classes are to be sent.

Acceptable values:	NO, YES, <i>list of classes</i> , an asterisk (*)
Default:	1
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP SMFACCT

This is a scrollable field.

**NO** Specifies no automatic start of classes.

**YES** Starts the trace for the default class (class 1). You might also need to update the SMFPRMxx member of SYS1.PARMLIB to permit SMF to write the records.

### *list of classes*

| Starts the specified classes. Enter a list of class numbers (any integer from  
| 1 to 32), separated by commas. Only classes 1 to 5, 7, 8, and 10 are defined  
| by DB2.

### **asterisk (\*)**

Starts all classes.

### Related concepts:

 [Accounting trace \(DB2 Performance\)](#)

### Related tasks:

Installation step 8: Record DB2 data to SMF (optional)



## SMF STATISTICS field (SMFSTAT subsystem parameter)

The SMFSTAT subsystem parameter specifies whether DB2 is to send statistical data to SMF automatically when DB2 is started. This parameter also specifies which classes are sent.

Acceptable values:	NO, YES, <i>list of classes</i> , an asterisk (*)
Default:	YES
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP SMFSTAT

This is a scrollable field.

**NO** Specifies no automatic start.

**YES** Starts the trace for the default classes (classes 1, 3, 4, 5, and 6). You might also need to update the SMFPRMxx member of SYS1.PARMLIB to permit SMF to write the records.

### *list of classes*


Starts the specified classes. Enter a list of class numbers (any integer from 1 to 32), separated by commas. Only classes 1 to 5 are defined by DB2.

### **asterisk (\*)**

Starts all classes.

### **Related tasks:**

Installation step 8: Record DB2 data to SMF (optional)

 Monitoring concurrency and locks (DB2 Performance)

## STATISTICS TIME field (STATIME subsystem parameter)

The STATIME subsystem parameter specifies the time interval, in minutes, between statistics collections. Statistics records are to be written at approximately the end of this interval.

The STATIME subsystem parameter applies only to IFCIDs 0105, 0106, 0199, and 0365. In DB2 10 IFCIDs 0001, 0002, 0202, 0217, 0225, and 0230 are not controlled by STATIME, and the corresponding trace records are written at fixed one-minute intervals.

Acceptable values:	1 to 60
Default:	1
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP STATIME

## STATISTICS SYNC field (SYNCVAL subsystem parameter)

The SYNCVAL subsystem parameter specifies whether DB2 statistics recording is to be synchronized with some part of the hour, such as 15 minutes past the hour.

In DB2 10, the SYNCVAL subsystem parameter applies only to IFCIDs 0105, 0106, and 0199. IFCIDs 0001, 0002, 0202, 0217, 0225, and 0230 are not controlled by SYNCVAL, and the corresponding trace records are written at fixed, one-minute intervals.

Acceptable values:	NO, 0 to 59
Default:	NO

Update: option 14 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP SYNCVAL

**NO** Specifies that statistics recording is not synchronized. NO is the default.

**0 to 59**

DB2 statistics recording interval is synchronized with the beginning of the hour (0 minutes past the hour) or with any number of minutes past the hour up to 59. This parameter has no effect if STATIME is greater than 60.

**Example**

You want the DB2 statistics recording interval to have a length of 15 minutes and to be synchronized with 15 minutes past the hour. Thus, DB2 statistics are recorded at 15, 30, 45, and 60 minutes past the hour. To establish this interval, you would specify the following:

STATIME=15  
SYNCVAL=15

**DATASET STATS TIME field (DSSTIME subsystem parameter)**

The DSSTIME subsystem parameter specifies the time interval, in minutes, that is to occur between the resetting of data set statistics for online performance monitors.

Acceptable values: 1 to 60  
Default: 5  
Update: option 14 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP DSSTIME

Online performance monitors can request DB2 data set statistics for the current interval with an IFI READS request for IFCID 0199.

**MONITOR TRACE field (MON subsystem parameter)**

The MON subsystem parameter specifies whether the monitor trace is to start automatically when DB2 is started. The trace can be started for all classes, a default class, or a specified list of classes.

Acceptable values: NO, YES, *list of classes*, an asterisk (\*)  
Default: NO  
Update: option 14 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP MON

This is a scrollable field.

**NO** Specifies no automatic start.

**YES** Starts the trace for the default classes (class 1) whenever DB2 is started.


***list of classes***

Start the trace automatically for the specified classes. Enter a list of class numbers (any integer from 1 to 32), separated by commas. Only classes 1 to 8 are defined by DB2.

**asterisk (\*)**

Starts the trace automatically for all classes.

## Related concepts:

 Monitor trace (DB2 Performance)

### MONITOR SIZE field (MONSIZE subsystem parameter)

The MONSIZE subsystem parameter determines the default buffer size that is to be used for monitor traces when data is sent to monitor destinations.

Acceptable values:	1048576 to 67108864
Default:	1048576
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP MONSIZE

You can enter the value in bytes (for example, 4194304) or use the abbreviation K for kilobytes (for example, 4096K) or M for megabytes (for example, 4M).

### UNICODE IFCIDS field (UIFCIDS subsystem parameter)

The UIFCIDS subsystem parameter specifies whether output from IFC records is to include Unicode information.

Acceptable values:	NO, YES
Default:	NO
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP UIFCIDS

Only a subset of the character fields are encoded in Unicode. These fields are identified in the IFCID record definition by a %U in the comment area to the right of the field declaration in the DSNDDQWxx copy files. The remaining fields maintain the same encoding of previous releases.

### DDF/RRSAF ACCUM field (ACCUMACC subsystem parameter)

The ACCUMACC parameter determines whether DB2 accounting data is to be accumulated by the user for DDF and RRSFAF threads.

Acceptable values:	NO, 2 to 65535
Default:	10
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP ACCUMACC

**NO** DB2 writes an accounting record when a DDF thread is made inactive or when sign-on processing occurs for an RRSFAF thread.

#### *integer*


DB2 writes an accounting record every *integer* accounting intervals for a given user identifier. *integer* is between 2 and 65535.

A user identifier is a concatenation of one or more values, which can include the user ID, application name or transaction name, and workstation name. Those values are set by DDF threads, or by RRSFAF threads through the RRSFAF SIGNON, AUTH SIGNON, and CONTEXT SIGNON functions. The possible concatenations are described in “AGGREGATION FIELDS field (ACCUMUID subsystem parameter)” on page 346.

An accounting record might be written prior to the completion of *integer* accounting intervals for a given user in the following cases:

- An internal storage threshold is reached for the accounting rollup blocks.
- DB2 has not rolled data into an internal block in approximately 10 minutes.


**Related concepts:**

 Accounting trace (DB2 Performance)

**Related tasks:**

 Minimizing the volume of DB2 trace data (DB2 Performance)

 Minimizing the processing cost of DB2 traces (DB2 Performance)

 Monitoring for performance exceptions (DB2 Performance)

**Related reference:**

AGGREGATION FIELDS field (ACCUMUID subsystem parameter)

## AGGREGATION FIELDS field (ACCUMUID subsystem parameter)

The ACCUMUID subsystem parameter determines the aggregation fields that are to be used for DDF and RRSF accounting rollup.

Acceptable values:	0 to 17
Default:	0
Update:	option 14 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP ACCUMUID

The values are defined in the following table.

Table 48. Values for the aggregation fields that are used for DDF and RRSF accounting rollup

Value	Rollup criteria	String of X'00' or string of X'40' considered for rollup?
0	User ID, application name or transaction name, and workstation name	Yes <sup>1</sup>
1	User ID	No
2	User application name or transaction name	No
3	User workstation name	No
4	User ID and application name or transaction name	Yes <sup>1</sup>
5	User ID and workstation name	Yes <sup>1</sup>
6	User application name or transaction name and workstation name	Yes <sup>1</sup>
7	User ID, application name or transaction name, and workstation name	No
8	User ID and application name or transaction name	No
9	User ID and workstation name	No
10	User application name or transaction name and workstation name	No
11	User ID, application name or transaction name, and workstation name	Yes
12	User ID	Yes

Table 48. Values for the aggregation fields that are used for DDF and RRSAF accounting rollup (continued)

Value	Rollup criteria	String of X'00' or string of X'40' considered for rollup?
13	User application name or transaction name	Yes
14	User workstation name	Yes
15	User ID and application name or transaction name	Yes
16	User ID and workstation name	Yes
17	User application name or transaction name and workstation name	Yes

**Note:**

1. At least one value in the set of criteria must have a value other than a string of X'00's or a string of X'40's.

For example, if a thread has the user ID set to a string of X'00' and the workstation name set to myws, the thread qualifies for rollup if ACCUMUID is set to 5, but not if ACCUMUID is set to 9.

Assume that ACCUMUID is set to 5. The threads in the following table all qualify for rollup.

Table 49. Values for user ID and workstation name

User ID	Workstation name
myuser	myws
myuser	A string of X'40'
A string of X'40'	myws
myuser	A string of X'00'
A string of X'00'	myws

The thread with user ID set to myuser and workstation name set to a string of X'40' and the thread with user ID set to myuser and workstation name set to a string of X'00' are included in the same rollup record. The thread with user ID set to a string of X'40' and workstation name set to myws and the thread with user ID set to a string of X'00' and workstation name set to myws are included in the same rollup record.

DB2 writes individual accounting threads for threads that do not meet the criteria for rollup.

The value of ACCUMUID is ignored if the value of ACCUMACC is set to NO.

**Related concepts:**

 Accounting trace (DB2 Performance)

**Related tasks:**

 Minimizing the volume of DB2 trace data (DB2 Performance)

 Minimizing the processing cost of DB2 traces (DB2 Performance)

 Monitoring for performance exceptions (DB2 Performance)

## COMPRESS SMF RECS field (SMFCOMP subsystem parameter)

The SMFCOMP subsystem parameter specifies whether DB2 is to compress trace records that are to be written to SMF.

Acceptable values: OFF, ON  
Default: OFF  
Update: option 14 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP SMFCOMP

**OFF** SMF trace records are not compressed.

**ON** Trace records that are to be written to SMF are compressed. The z/OS compression service CSRCE SRV compresses everything after the SMF header (SM100END, SM101END, or SM102END). See SM100, SM101, and SM102 for compression flags and the uncompressed size of compressed data.

---

## DSNTIPO: Operator functions panel

The entries on the DSNTIPO panel affect various operator functions. These functions include write-to-operator route codes, automatic recall, and the maximum amount of CPU time that is to be allocated for a dynamic SQL statement.

```
DSNTIPO          INSTALL DB2 - OPERATOR FUNCTIONS
====> -
Enter data below:

 1 WTO ROUTE CODES   ====> 1
                               Routing codes for WTORS
 2 RECALL DATABASE   ====> YES   Use DFHSM automatic recall. YES or NO
 3 RECALL DELAY      ====> 120   Seconds to wait for automatic recall
 4 RLF AUTO START    ====> NO    Resource Limit Facility. NO or YES
 5 RLST NAME SUFFIX  ====> 01    Resource Limit Spec. Table (RLST)
 6 RLST ACCESS ERROR ====> NOLIMIT NOLIMIT, NORUN, or 1-5000000
 7 AUTO BIND         ====> YES   Use automatic bind. YES, NO, or COEXIST
 8 EXPLAIN PROCESSING ====> YES  Explain allowed on autobind? YES or NO
 9 DPROPS SUPPORT    ====> 1     1=NO 2=ONLY 3=ANY
10 SITE TYPE         ====> LOCALSITE LOCALSITE or RECOVERYSITE
11 TRACKER SITE      ====> NO    Tracker DB2 system. NO or YES
12 READ COPY2 ARCHIVE ====> NO   Read COPY2 archives first. NO or YES
13 REAL TIME STATS   ====> 30    RTS time interval in minutes 1-1440
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```



Figure 30. Operator functions panel: DSNTIPO

## WTO ROUTE CODES field (ROUTCDE subsystem parameter)

The ROUTCDE subsystem parameter specifies the z/OS console routing codes that are to be assigned to messages that are not solicited from a specific console.

Acceptable values: 1 to 16 route codes. Specify at least one code. Separate multiple codes by commas only, with no blanks; for example: 1,3,5,7,9,10,11.  
Default: 1  
Update: option 15 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP ROUTCDE

**Related reference:**

-  Routing Codes (MVS System Messages)
-  Routing the Message (z/OS MVS Assembler Services Guide)

## **RECALL DATABASE field (RECALL subsystem parameter)**

The RECALL subsystem parameter controls whether DFSMSHsm automatic recall is to be performed for DB2 databases.

Acceptable values:	YES, NO
Default:	YES
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RECALL

- YES** Indicates that DFSMSHsm is invoked to automatically recall migrated table spaces.
- NO** Indicates that a DB2 table space that has been migrated is considered to be an unavailable resource. It must be recalled explicitly before DB2 can use it.

## **RECALL DELAY field (RECALLD subsystem parameter)**

The RECALLD subsystem parameter specifies the maximum length of time, in seconds, that a program can be delayed for a DFSMSHsm recall.

Acceptable values:	0 to 32767
Default:	120
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RECALLD

If the recall is not completed within the specified number of seconds, the program receives an error message indicating that the set is unavailable, but that a recall was initiated. If you use 0 and the RECALL DATABASE field is YES, the recall is performed asynchronously. This field is ignored if the RECALL DATABASE field is NO.


The RECALL DELAY option is not used when running a DB2 utility against a DB2-migrated data set.

## **RLF AUTO START field (RLF subsystem parameter)**

The RLF subsystem parameter specifies whether the resource limit facility (governor) is to automatically start each time DB2 is started.

Acceptable values:	YES, NO
Default:	NO
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP RLF

**Related concepts:**

-  Resource limit facility controls (DB2 Performance)

## RLST NAME SUFFIX field (RLFTBL subsystem parameter)

The RLFTBL subsystem parameter specifies the suffix that is to be used for the default resource limit specification table (RLST). The default RLST is used when the resource limit facility (governor) is automatically started or when the governor is started without a specified suffix.

Acceptable values:	any 2 alphanumeric characters; national characters are not allowed
Default:	01
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP RLFTBL

## RLST ACCESS ERROR field (RLFERR subsystem parameter)

The RLFERR subsystem parameter specifies the action that DB2 takes for dynamic SQL statements that originate from the local server if the resource limit facility encounters a condition that prevents it from accessing the resource limit specification table, or when DB2 cannot find an applicable row in the resource limit specification table.

An applicable row is one that applies to the authorization ID, collection ID, package name, and name of the logical unit of work of the query user.

Acceptable values:	NOLIMIT, NORUN, 1 to 5000000
Default:	NOLIMIT
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP RLFERR

### **NOLIMIT**

Allows all dynamic SQL statements to run without limit.


### **NORUN**

Terminates all dynamic SQL statements immediately with an SQL error code.


### **1 to 5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

### **Related tasks:**

 [Setting limits for system resource usage by using the resource limit facility \(DB2 Performance\)](#)

### **Related reference:**

 [DSNRLSTxx resource limit tables \(DB2 Performance\)](#)

## AUTO BIND field (ABIND subsystem parameter)

The ABIND subsystem parameter specifies whether DB2 automatically rebinds packages and plans in certain situations at run time.

Acceptable values:	YES, NO, COEXIST
Default:	YES
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM ABIND

**Tip:** Automatic rebinds can improve the availability and administration of packages and plans, by reducing the need for explicit rebinds. However, automatic



binds can also harm performance because they require access to the DB2 catalog and directory, resource contention might cause them to fail, and they might result in access path regressions. For best results enable automatic binds by specifying COEXIST in data-sharing environments and YES in non-data-sharing environments, but also take action to avoid migration-related automatic binds.

- YES** Specifies that DB2 automatically rebinds packages or plans at run time in the following conditions:
- A package runs that is marked invalid (VALID='N' in the SYSIBM.SYSPACKAGE catalog table).
  - A package that was last bound in a release earlier than Version 6 Release 1 runs in DB2 10.
  - In release coexistence or fallback, a package or plan that was last bound on DB2 10 and it runs again on DB2 9 or Version 8. After the automatic bind, the package or plan can continue to run without automatic binds until it runs on DB2 10 again.
  - In release coexistence or during remigration after fallback, a package or plan that was automatically bound on DB2 9 or Version 8 runs again on DB2 10. These automatic binds are called *remigration binds*.

### COEXIST

Specifies that no automatic remigration binds occur. DB2 automatically rebinds packages or plans at run time in the following conditions:


- A package that is marked invalid runs (VALID='N' in the SYSIBM.SYSPACKAGE catalog table).
- A package that was last bound in a release earlier than Version 6 Release 1 runs in DB2 10.
- In release coexistence, the package was last bound on DB2 10 and it runs again on DB2 9 or Version 8. After the automatic bind, the package or plan can continue to run without automatic binds, even if it runs again on DB2 10. Packages and plans continue to run on DB2 10 as bound on DB2 9 or Version 8. The plan or package does not use any new features that DB2 10 introduces.

If COEXIST is specified in non-data-sharing environments, DB2 uses YES behavior.

- NO** Specifies that no automatic binds occur. If any of the following conditions are true when a package attempts to run, DB2 issues SQLCODE -908 SQLSTATE 23510, unless you explicitly rebind the package:
- A package is marked invalid (VALID='N' in the SYSIBM.SYSPACKAGE catalog table).
  - A package that was last bound (explicitly or automatically) in DB2 10 attempts to run on DB2 9 or Version 8.

### Related concepts:

Automatic binds in coexistence

 Changes that invalidate packages (DB2 Application programming and SQL)

## EXPLAIN PROCESSING field (ABEXP subsystem parameter)

The ABEXP subsystem parameter controls whether EXPLAIN processing is to occur during an automatic rebind.

Acceptable values: YES, NO  
Default: YES

Update: option 15 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM ABEXP

- YES** EXPLAIN processing occurs during the automatic rebind of a plan or package when the bind option EXPLAIN(YES) is specified. If the PLAN\_TABLE does not exist, the automatic rebind continues, but generates no EXPLAIN output. EXPLAIN processing does not occur during the automatic rebind of plans or packages with the bind option EXPLAIN(NO).
- NO** EXPLAIN processing does not occur during the automatic rebind of a plan or package.

## DPROP SUPPORT field (EDPROP and CHGDC subsystem parameters)

The value of the DPROP SUPPORT field determines whether IMS DataPropagator is to be used to propagate SQL changes to tables defined with DATA CAPTURE CHANGES.

Acceptable values: 1, 2, 3  
Default: 1  
Update: option 15 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM EDPROP, DSN6SPRM CHGDC

- 1** Specifies that you do not intend to propagate SQL changes.
- 2** Specifies that you intend to use IMS DataPropagator to propagate SQL changes, and that changes made to tables defined with DATA CAPTURE CHANGES are allowed **only** when all of the following conditions are met:
- Monitor trace class 6 is active.
  - IMS DataPropagator is installed.
  - The DB2 application is running in an IMS environment.

If you specify 2 and monitor trace class 6 is not active, IMS DataPropagator is not installed, or the IMS DataPropagator application is not running in an IMS environment, then no changes to the DB2 table are permitted.

- 3** Specifies that data propagation occurs when all of the following conditions are met:
- Monitor trace class 6 is active.
  - IMS DataPropagator is installed.
  - The DB2 application is running in an IMS environment.

The ANY option for IMS DataPropagator Support is intended for subsystems that need to propagate some data with IMS DataPropagator and need to propagate some data with a different program.

If you specify 3, an application that is not running in an IMS environment can update DB2 tables that are defined with DATA CAPTURE CHANGES. However, these changes are not propagated to IMS. You might have tables in your DB2-IMS environment that you want to be updated only by DB2 applications. You can protect these tables by using any of the following methods:

- Use the ENABLE parameter on BIND to specify a specific attachment facility through which updates to data propagation tables can be made.

- Define a validation procedure for data propagation tables to allow only certain plans to update those tables.
- Use a group authorization ID to assign update authority for data propagation tables to a group of authorization IDs that can run only in the IMS environment.

The DPROP SUPPORT field values correspond with the CHGDC and EDPROP subsystem parameters as indicated in the following table.

*Table 50. Relationship between DPROP SUPPORT field and CHGDC and EDPROP subsystem parameters*

DPROP SUPPORT field value	CHGDC setting	EDPROP setting
1	NO	NO
2	YES	YES
3	YES	NO

**Related concepts:**

 [IMS DataPropagator](#)

## SITE TYPE field (SITETYP subsystem parameter)

The SITETYP subsystem parameter specifies whether the current system is at a local site or a recovery site.

Acceptable values:	LOCALSITE, RECOVERYSITE
Default:	LOCALSITE
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SITETYP

### LOCALSITE

Specifies that the current system is at the site where the multiple image copies are made and are operational.

### RECOVERYSITE

Specifies that the current system is at the site that is named as an alternative for recovery purposes.


The RECOVER utility uses this value to determine what site the current system is on. It then recovers everything from the copies of data that are registered at that site. The RECOVER and MERGECOPY utilities use this value to determine whether COPYDDN or RECOVERDDN is allowed with NEWCOPY NO.

## TRACKER SITE field (TRKRSITE subsystem parameter)

The value of the TRKRSITE subsystem parameter indicates whether the subsystem that is being installed is to be used as a remote tracker site. A remote tracker site is used by another DB2 subsystem in case of a disaster.

Acceptable values:	NO, YES
Default:	NO
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM TRKRSITE

**Related tasks:**

 [Recovering from disasters by using a tracker site \(DB2 Administration Guide\)](#)

## READ COPY2 ARCHIVE field (ARC2FRST subsystem parameter)

The ARC2FRST subsystem parameter determines whether COPY2 archives are to be read first when the DB2 subsystem is started.


Acceptable values:	NO, YES
Default:	NO
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6LOGP ARC2FRST

## REAL TIME STATS field (STATSINT subsystem parameter)

The STATSINT subsystem parameter specifies the interval, in minutes, at which DB2 writes in-memory page set statistics to the real-time statistics tables. DB2 waits the specified number of minutes after the completion of the previous operation to begin the next operation.

Acceptable values:	1 to 1440
Default:	30
Update:	option 15 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM STATSINT

### Related concepts:

 When DB2 externalizes real-time statistics (DB2 Performance)

### Related reference:

 SYSIBM.SYSINDEXSPACESTATS table (DB2 SQL)

 SYSIBM.SYSTABLESPACESTATS table (DB2 SQL)

---

## DSNTIPO3: Default startup modules panel

The DSNTIPO3 panel enables you to specify the default member names of certain modules that are to be loaded at DB2 startup. These modules are the subsystem parameter module, the application defaults module, and the exit modules.

```
DSNTIPO3      INSTALL DB2 - DEFAULT STARTUP MODULES
====> _

Enter data below:

 1 PARAMETER MODULE   ==> DSNZPARM  DB2 subsystem parameter module name
 2 APPL DEFAULTS     ==> DSNHDECP  Application defaults module name
 3 ACCESS CONTROL     ==> DSNX@XAC  Access Control Exit module name
 4 IDENTIFY/AUTH     ==> DSN3@ATH  Identify/Authorization Exit module name
 5 SIGNON             ==> DSN3@SGN  Signon Exit module name
```

```
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 31. Default startup modules panel: DSNTIPO3

## PARAMETER MODULE field

The value of the PARAMETER MODULE field specifies the member name of the load module that is to be used for DB2 subsystem parameters.

Acceptable values:	1 to 8 characters
Default:	DSNZPARM
Update:	option 16 on panel DSNTIPB
DSNZPxxx:	none

The parameter module typically resides in library *prefix.SDSNEXIT*. To avoid conflict with members of *prefix.SDSNLOAD*, use *DSNZPxxx*, where *xxx* is any set of three alphanumeric characters. DB2 puts this name in the startup JCL procedure in *SYS1.PROCLIB*, but you can override this value by using the *START DB2* command.

## APPL DEFAULTS field

The value of the APPL DEFAULTS field specifies the member name of the load module that is to be used for DB2 application default values.

Acceptable values:	for installation: 1 - 8 characters; for migration: DSNHDECP
Default:	DSNHDECP
Update:	option 16 on panel DSNTIPB
DSNZPxxx:	none

This module typically resides in library *prefix.SDSNEXIT*. The application default values that are specified within this module are defined by panels *DSNTIPK*, *DSNTIPM*, *DSNTIPF*, and *DSNTIP4*. The value that is entered in this field will be assigned to the *DECP* parameter of the *ssnmMSTR* startup JCL procedure in *SYS1.PROCLIB*. The *DECP* parameter specifies the name of the applications defaults module that is to be loaded by default when DB2 is started. You can override this value by using the *DECP* option of the *START DB2* command. If you use a name that starts with *DSN*, use *DSNHDExx*, where *xx* is any set of two alphanumeric characters. This naming convention avoids conflict with members of *prefix.SDSNLOAD*.

If you specify a name other than *DSNHDECP*, the *DSNTIJUZ* and *DSNTIJNG* jobs create a module with that name, with an alias of *DSNHDECP*. If alias *DSNHDECP* already exists, it is replaced. If a module that is named *DSNHDECP* already exists, the link-edit request fails. In this case, you must delete the *DSNHDECP* module or remove the *ALIAS* directive for *DSNHDECP* from the link-edit in job step *DSNTIZQ* of *DSNTIJUZ* and *DSNTIJNG*.

If you run the installation *CLIST* in *MIGRATE* mode, this field is always set to *DSNHDECP* and cannot be modified. The following restrictions apply to the application defaults member name during migration:

- Use of an application defaults member name other than *DSNHDECP* requires DB2 10 new-function mode and DB2 10 early (ERLY) code. If these conditions are satisfied after migration, you can optionally create an application defaults member with a different name, and specify it in the *DECP* parameter of the *START DB2* command. You can also modify the setting of the *DECP* parameter of the *ssnmMSTR* startup JCL procedure to use the new name by default.

- Use of an application defaults member name other than DSNHDECP prior to DB2 10 new-function mode causes DB2 startup to fail with abend 04E, reason code 00E3001C.
- Use of an application defaults member name other than DSNHDECP under pre-DB2 10 ERLY code causes DB2 startup to fail with abend 04E, reason code 00E3001D.

This parameter cannot be changed online.

## **ACCESS CONTROL field (ACCESS\_CNTL\_MODULE subsystem parameter)**

The value of this field specifies the member name of the load module that is to be used for the DB2 access control exit routine.

Acceptable values:	for installation: 1 - 8 characters; for migration: DSNX@XAC
Default:	DSNX@XAC
Update:	option 16 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP ACCESS_CNTL_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSNX@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSNX@XAC, the DSNTIJEX job creates a module with that name, with an alias of DSNX@XAC. If alias DSNX@XAC already exists, it is replaced. If a module that is named DSNX@XAC already exists, the link-edit request fails. In this case, you must delete the DSNX@XAC module or remove the ALIAS directive for DSNX@XAC from the link-edit in job step JEX0003 of DSNTIJEX.

If you run the installation CLIST in MIGRATE mode, this field is always set to DSNX@XAC and cannot be modified. The following restrictions apply to the member name for the access control exit routine during migration:

- Use of a member name other than DSNX@XAC for the access control exit routine requires DB2 10 new-function mode and DB2 10 early (ERLY) code. If these conditions are satisfied after migration, you can optionally create an access control exit member with a different name, and specify that name as the setting of the ACCESS\_CNTL\_MODULE subsystem parameter.
- Use of a member name other than DSNX@XAC for the access control exit routine prior to DB2 10 new-function mode causes DB2 startup to fail with abend 04E, reason code 00E3001C.
- Use of a member name other than DSNX@XAC for the access control exit routine under pre-DB2 10 ERLY code causes DB2 startup to fail with abend 04E, reason code 00E3001D.

This parameter cannot be changed online.

## **IDENTIFY/AUTH field (IDAUTH\_MODULE subsystem parameter)**

The value of this field specifies the member name of the load module that is to be used for the DB2 connection authorization exit routine.

Acceptable values:	for installation: 1 - 8 characters; for migration: DSN3@ATH
Default:	DSN3@ATH
Update:	option 16 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP IDAUTH_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSN3@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSN3@ATH, the DSNTIJEX job creates a module with that name, with an alias of DSN3@ATH. If alias DSN3@ATH already exists, it is replaced. If a module that is named DSN3@ATH already exists, the link-edit request fails. In this case, you must delete the DSN3@ATH module or remove the ALIAS directive for DSN3@ATH from the link-edit in job step JEX0002 of DSNTIJEX.

If you run the installation CLIST in MIGRATE mode, this field is always set to DSN3@ATH and cannot be modified. The following restrictions apply to the member name for the connection authorization exit routine during migration:

- Use of a member name other than DSN3@ATH for the connection authorization exit routine requires DB2 10 new-function mode and DB2 10 early (ERLY) code. If these conditions are satisfied after migration, you can optionally create a connection authorization member with a different name, and specify that name as the setting of the IDAUTH\_MODULE subsystem parameter.
- Use of a member name other than DSN3@ATH for the connection authorization exit routine prior to DB2 10 new-function mode causes DB2 startup to fail with abend 04E, reason code 00E3001C.
- Use of a member name other than DSN3@ATH for the connection authorization exit routine under pre-DB2 10 ERLY code causes DB2 startup to fail with abend 04E, reason code 00E3001D.

This parameter cannot be changed online.

## **SIGNON field (SIGNON\_MODULE subsystem parameter)**

The value of this field specifies the member name of the load module that is to be used for the DB2 sign-on exit routine.

Acceptable values:	for installation: 1 - 8 characters; for migration: DSN3@SGN
Default:	DSN3@SGN
Update:	option 16 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP SIGNON_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSN3@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSN3@SGN, the DSNTIJEX job creates a module with that name, with an alias of DSN3@SGN. If alias DSN3@SGN already exists, it is replaced. If a module that is named DSN3@SGN already exists, the link-edit


request fails. In this case, you must delete the DSN3@SGN module or remove the ALIAS directive for DSN3@SGN from the link-edit in job step JEX0001 of DSNTIJEX.

If you run the installation CLIST in MIGRATE mode, this field is always set to DSN3@SGN and cannot be modified. The following restrictions apply to the member name for the sign-on exit routine during migration:

- Use of a member name other than DSN3@SGN for the sign-on exit routine requires DB2 10 new-function mode and DB2 10 early (ERLY) code. If these conditions are satisfied after migration, you can optionally create a connection authorization member with a different name, and specify that name as the setting of the SIGNON\_MODULE subsystem parameter.
- Use of a member name other than DSN3@SGN for the sign-on exit routine prior to DB2 10 new-function mode causes DB2 startup to fail with abend 04E, reason code 00E3001C.
- Use of a member name other than DSN3@SGN for the sign-on exit routine under pre-DB2 10 ERLY code causes DB2 startup to fail with abend 04E, reason code 00E3001D.

This parameter cannot be changed online.

**Related concepts:**

 [Connection routines and sign-on routines \(Managing Security\)](#)

**Related tasks:**

Migration step 15: Define user authorization exit routines: DSNTIJEX (optional)

---

## DSNTIPF: Application programming defaults panel 1

The entries on the DSNTIPF panel and the DSNTIP4 panel define application programming default values. These values are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler. These values can also be used as default values by other programs, such as QMF.

***Migrating or updating the parameters:*** If you alter parameter values for which a change during migration or update is “not recommended,” this change can invalidate the syntax of existing SQL statements or affect the way that application programs run. Update is allowed, but must be handled with caution.

Most of the values that are set here and on the DSNTIP4 panel are contained in the application defaults load module, *dsnhdecpr*. The load module is located in library *prefix.SDSNEXIT*, which can be loaded and accessed by application programs. When modifying the application defaults load module, do so only by changing and running the installation CLIST.

**Important:** You should always use the CLIST to modify installation parameters. Do not directly modify the data in the application defaults load module. If you modify any installation parameters by changing job DSNTIJUZ directly, these values are not recorded for later updates, new installations, or migrations. In addition, these values are not checked for validity. If you do not use the CLIST to modify these parameters, DB2 may not start.

Many of the fields on this panel involve the selection of coded character set identifiers (CCSIDs). Here is some information that can help you choose values for these fields:



- If you choose YES for the MIXED DATA field, you must specify a mixed data CCSID from Table 170 on page 993 or Table 171 on page 994. An error occurs if you do not specify a CCSID or if the CCSID you specify is not listed in the table.
- If you specify an incorrect CCSID, data can become corrupted. For example, assume that the coded character set used at your site is 37, but you specify 500 as the system CCSID. If DB2 receives data with a CCSID of 500, the data can become corrupted because character conversion does not occur. Conversely, if DB2 receives data with a CCSID other than 500 and a conversion is made from that CCSID to 500, the data can become corrupted because character conversion occurs.

**Recommendation:** Never change CCSIDs on an existing DB2 system without specific guidance from IBM Software Support.

- If you need to convert to a CCSID that supports the euro symbol, you can correct it by altering the CCSID field for your default encoding scheme.
- During code conversion, DB2 first looks in the SYSSTRINGS table to see if a conversion is defined. If DB2 finds a conversion, it is used. If DB2 does not find a conversion, it uses z/OS Unicode Services. In some cases, z/OS Unicode Services is used instead of the value in SYSSTRINGS. If the conversion is not available, an error occurs.
- Converting statements to Unicode for parsing depends on having the correct input CCSID specified. The system CCSIDs must be set up correctly at installation time.

During connect processing, a requester and server provide default CCSIDs for character data sent on the connection.

The DB2 requester uses the application encoding scheme for its default CCSIDs. If an application provides character data that is not in the CCSID that the application encoding scheme identifies, DB2 overrides the default CCSID by tagging each field with the actual CCSID prior to sending to the server. For applications that use the Unicode encoding scheme, the DB2 requester overrides the application encoding scheme CCSIDs with the system EBCDIC CCSIDs and converts the Unicode data to EBCDIC if DB2 determines that the server does not support Unicode character data. If the server cannot accept character data in these CCSIDs, connect fails with a -332 SQLCODE.

The DB2 server uses the system default encoding scheme to determine the default CCSID values for character data that is to be returned to the requester. For servers using the encoding scheme of Unicode, the DB2 server overrides the Unicode encoding scheme CCSIDs with the system EBCDIC CCSIDs and converts the Unicode data to EBCDIC if DB2 determines that the requester does not support Unicode character data. If the requester cannot accept character data in these CCSIDs, connect fails with a -332 SQLCODE.

```

DSNTIPF          INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 1
====> _

Enter data below:

1 LANGUAGE DEFAULT      ====> IBMCOB   ASM,C,CPP,IBMCOB,FORTRAN,PLI
2 DECIMAL POINT IS     ====> .         . or ,
3 STRING DELIMITER     ====> DEFAULT  DEFAULT, " or ' (COBOL or COB2 only)
4 SQL STRING DELIMITER  ====> DEFAULT  DEFAULT, " or '
5 DIST SQL STR DELIMTR  ====> '         ' or "
6 MIXED DATA          ====> NO        NO or YES for mixed DBCS data
7 EBCDIC CCSID         ====>          CCSID of SBCS or mixed data. 1-65533.
8 ASCII CCSID          ====>          CCSID of SBCS or mixed data. 1-65533.
9 UNICODE CCSID        ====> 1208     CCSID of UNICODE UTF-8 data.
10 DEF ENCODING SCHEME  ====> EBCDIC   EBCDIC, ASCII, or UNICODE
11 APPLICATION ENCODING  ====> EBCDIC   EBCDIC, ASCII, UNICODE, ccsid (1-65533)
12 LOCALE LC_CTYPE     ====>
13 DECFLOAT ROUNDING MODE====> ROUND_HALF_EVEN

PRESS:  ENTER to continue  RETURN to exit  HELP for more information


```

Figure 32. Application programming defaults panel: DSNTIPF

**Related concepts:**


Euro symbol support

**Related tasks:**

 Processing SQL statements (DB2 Application programming and SQL)

**Related reference:**

DSNTIP4: Application programming defaults panel 2

 Code set converters supplied (XL C/C++ Programming Guide)

## LANGUAGE DEFAULT field (DEFLANG DECP value)

The DEFLANG DECP value identifies the default programming language that is to be used for your site.

Acceptable values:	ASM, C, CPP, FORTRAN, IBMCOB, PLI
Default:	IBMCOB
Update:	not recommended
<i>dsnhdcp::</i>	DEFLANG

**ASM**

Specifies High Level Assembler/MVS as the default programming language.

**C**

Specifies C as the default programming language. If you specify C, you can fold SQL identifiers to uppercase. However, this is not a default from any installation panel.

**CPP**

Specifies C++ as the default programming language. If you specify CPP, you can fold SQL identifiers to uppercase. However, this is not a default from any installation panel.

**FORTRAN**

Specifies Fortran as the default programming language.

**IBMCOB**

Specifies Enterprise COBOL for z/OS as the default programming language.

**PLI**

Specifies PL/I as the default programming language.

**Related concepts:**

 Precompiler option list format (DB2 Application programming and SQL)

## DECIMAL POINT IS field (DECIMAL DECP value)

The DECIMAL DECP value determines whether the decimal point for numbers is to be a comma (,) or a period (.).

Acceptable values:	. (period) or , (comma)
Default:	. (period)
Update:	recommended only to recover an error
<i>dsnhdecy</i> :	DECIMAL

For example, some nations customarily signify the number “one and one-half,” as 1.5; other nations use 1,5 for the same value.

This parameter is used in the following cases:


- For running dynamic SQL statements with DYNAMICRULES:
  - Whether the value of field DECIMAL POINT IS is COMMA or PERIOD, DB2 recognizes the value as the decimal point for numbers.
- For binding, defining, or invoking dynamic SQL statements with DYNAMICRULES:
  - If the value of field USE FOR DYNAMICRULES is NO, DB2 does not use the value in field DECIMAL POINT IS if you specify the option COMMA or PERIOD when you precompile the application that contains the dynamic SQL statements. DB2 uses the precompiler option to determine the decimal point for numbers.
  - If the value of field USE FOR DYNAMICRULES is YES, and the value of field DECIMAL POINT IS is PERIOD or COMMA, DB2 recognizes the value as the decimal point for numbers.
- For static SQL statements in COBOL programs, DECIMAL POINT IS specifies the default precompiler option (PERIOD or COMMA).

This parameter is the default for binds at this DB2 site that are requested by a remote system that does not indicate whether the period or the comma is used to represent a decimal point. In most cases, however, requesting systems give DB2 this information.

**Related concepts:**

 Decimal point representation (DB2 SQL)

**Related reference:**

 DYNAMICRULES bind option (DB2 Commands)

## STRING DELIMITER field (DELIM DECP value)

The DELIM DECP value determines the string delimiter that is to be used for COBOL.

Acceptable values:	DEFAULT, " (quotation mark), ' (apostrophe)
Default:	DEFAULT
Update:	not recommended
<i>dsnhdecy</i> :	DELIM

|

This option is effective for all varieties of COBOL.

**DEFAULT**

The string delimiter is the quotation mark.

" The string delimiter is the quotation mark.

' The string delimiter is the apostrophe.

See the SQL STRING DELIMITER field for a description of how to use this field to get the set of character string delimiters for COBOL and SQL.

**SQL STRING DELIMITER field (SQLDELI DECP value)**

The SQLDELI DECP value specifies the character that is to be used as the SQL string delimiter to delimit character strings in dynamic SQL.

Acceptable values:           DEFAULT, " (quotation mark), ' (apostrophe)  
 Default:                        DEFAULT  
 Update:                         not recommended  
*dsnhdcp*:                      SQLDELI

This option is effective for all varieties of COBOL.

The value in this field also determines which character is the escape character for delimited identifiers in dynamic SQL. If you specify an apostrophe in this field, you get a quotation mark for your SQL escape character. If you specify a quotation mark in this field, you get an apostrophe for your SQL escape character.

For SQL statements that are embedded in COBOL programs, COBOL precompiler options specify which character is the SQL string delimiter and which character is the SQL escape character. If you specify DEFAULT in this field, a quotation mark is passed to the precompiler as the default SQL string delimiter.

Some applications might require a particular value for the SQL STRING DELIMITER. Determine the required values for those applications before installing DB2.

The following table shows the different combinations of character string delimiters that result from specifying different values in the STRING DELIMITER field and the SQL STRING DELIMITER field.

*Table 51. Effect of STRING DELIMITER field and SQL STRING DELIMITER field on SQL and COBOL string delimiters*

When you want this combination of character string delimiters...			Specify this in STRING DELIMITER field	Specify this in SQL STRING DELIMITER field
COBOL	Dynamic SQL	Embedded SQL		
"	'	"	DEFAULT	DEFAULT
'	'	'	'	'
"	"	"	"	"
"	'	'	"	'

The values that you specify in the STRING DELIMITER field and the SQL STRING DELIMITER field are also used by the program preparation panels, the DSNH

CLIST, and the precompiler. The following table shows why you might specify different combinations of values in these fields.

*Table 52. Effect of the STRING DELIMITER field and the SQL STRING DELIMITER field on precompiler options*

<b>Purpose</b>	<b>STRING DELIMITER field</b>	<b>SQL STRING DELIMITER field</b>
Force APOST default (even in COBOL) and provide a default similar to APOST in DB2 Server for VSE & VM.	'	'
Change dynamic query string delimiter to the quotation mark. This is helpful if you use COBOL with the QUOTE option. It allows queries to be tested with dynamic SQL and moved into the program more easily.	"	"
Enables compatibility with the DB2 Server for VSE & VM option.	"	'

## **DIST SQL STR DELIMTR field (DSQLDELI DECP value)**

The DSQLDELI DECP value specifies whether an apostrophe or quotation mark is to be used as the SQL string delimiter for bind operations at this DB2 site. This delimiter is to be used when the requester does not give DB2 that information.

In most cases, requesters tell DB2 whether the apostrophe or the quotation mark is to be used as the SQL string delimiter.

Acceptable values:	' (apostrophe) or " (quotation mark)
Default:	' (apostrophe)
Update:	not recommended
<i>dsnhdcp:</i>	DSQLDELI

## **MIXED DATA field (MIXED DECP value)**

The value of the MIXED DECP field indicates how the EBCDIC CCSID and ASCII CCSID fields are to be interpreted by DB2.

The MIXED DATA option has no effect on the UNICODE CCSID field. Regardless of the setting for MIXED DATA, UNICODE UTF-8 data is considered mixed data and is processed according to the rules for mixed data.

Acceptable values:	YES, NO
Default:	NO
Update:	not recommended
<i>dsnhdcp:</i>	MIXED

### **YES**

The CCSID that is specified in the EBCDIC CCSID and ASCII CCSID field must be the mixed CCSID for the encoding scheme. From this, DB2 determines the associated SBCS and DBCS CCSIDs for the encoding scheme. MIXED DATA YES allows EBCDIC and ASCII mixed-character data and graphic data to be defined.

**Important:** MIXED DATA applies to both the EBCDIC CCSID and ASCII CCSID. If you choose MIXED DATA YES, you must select mixed CCSIDs for EBCDIC and ASCII.

**NO** The CCSID specified in the EBCDIC CCSID or ASCII CCSID field must be the CCSID for the encoding scheme. MIXED DATA NO does not allow for EBCDIC or ASCII mixed character data or graphic data to be defined.

For EBCDIC data, the value specifies whether the code points X'0E' and X'0F' have special meaning as the shift-out and shift-in controls for character strings that include double-byte characters.

- NO indicates that these code points have no special meaning. Therefore, all character strings are single-byte character set (SBCS) data.
- YES indicates that these code points have the special meaning described above. Therefore, character strings can be either SBCS or MIXED data.

**Related reference:**

EBCDIC and ASCII support

## EBCDIC CCSID field (SCCSID, MCCSID, and GCCSID DECP values)

The value of the EBCDIC CCSID field specifies the default CCSID for EBCDIC-encoded character data that is stored in your DB2 subsystem or data sharing system.

DB2 uses this value to perform conversion of character data that is received from external sources including other database management systems. Choose this value carefully to avoid loss of data integrity. The values that you choose for EBCDIC CCSID and ASCII CCSID are closely related.

Acceptable values:	1 to 65533
Default:	(none)
Update:	not recommended; data integrity may be compromised
<i>dsnhddec</i> :	SCCSID (single-byte), MCCSID (mixed), GCCSID (graphic)

If you specify NO for the MIXED DATA field, the MCCSID and GCCSID values are 65534. If you specify YES for the MIXED DATA field, ensure that you use the correct single-byte CCSID and MCCSID.

**Recommendation:** Use this parameter to specify an MCCSID. By doing so, you also receive system CCSIDs for your SBCS and GRAPHIC data. If you edit DSNHDECP directly, you will not receive the system CCSIDs for your SBCS and GRAPHIC data.

Conversions are determined in the following order:

1. SYSIBM.SYSSTRINGS.
2. z/OS Unicode conversion services.

**Considerations for mixed data:**

- If the MIXED DATA field is set to YES, you must specify a MCCSID from EBCDIC and ASCII support. An error occurs if you do not specify a CCSID or if the CCSID you specify is not listed in the table.
- If you specify 930, 1390, or 5026, Katakana characters are allowed in ordinary identifiers, and letters are not changed to uppercase.

If you specify a CCSID that is recognized by DB2 but is inappropriate for your site, data might be corrupted. For example, assume that the coded character set at your site is 37, but you specify 500 as the system CCSID. If DB2 receives data with a CCSID of 37, the data might be corrupted because character conversion does not occur. Conversely, if DB2 receives data with a CCSID other than 500 and a conversion is made from that CCSID to 500, the data may be corrupted because character conversion does occur.

Altering CCSIDs can be very disruptive to a system. Converting to a CCSID that supports the euro symbol is potentially less disruptive because specific pre-euro CCSIDs map to specific CCSIDs for the euro. Converting to a different CCSID for other reasons, particularly when a DB2 system has been operating with the wrong CCSID, could render data unusable and unrecoverable.

**Recommendation:** Never change CCSIDs on an existing DB2 system without specific guidance from IBM Software Support.

**Related concepts:**

Euro symbol support

**Related reference:**

EBCDIC and ASCII support

**Related information:**

 [Character Data Representation Architecture Reference](#)

## ASCII CCSID field (ASCCSID, AMCCSID, AGCCSID DECP values)

The ASCII CCSID field identifies the default coded character set identifier (CCSID) for ASCII-encoded character data that is to be stored in your DB2 subsystem or data sharing system.

DB2 uses the value of this field to convert character data that is received from external sources, including other database management systems. You must specify a value for this field, even if you do not have or plan to create ASCII-encoded objects. Choose this value carefully to prevent loss of data integrity.

Acceptable values:	1 to 65533
Default:	(none)
Update:	not recommended; data integrity may be compromised
<i>dsnhdecpr</i> :	ASCCSID (single-byte), AMCCSID (mixed), AGCCSID (graphic)

**Recommendation:** Never change CCSIDs on an existing DB2 system without specific guidance from IBM Software Support.

**Related reference:**

EBCDIC and ASCII support

EBCDIC CCSID field (SCCSID, MCCSID, and GCCSID DECP values)

## UNICODE CCSID field (USCCSID, UMCCSID, and UGCCSID DECP values)

The value of the UNICODE CCSID field specifies the CCSID that is to be used for Unicode data.

Acceptable values:	1208
Default:	1208
Update:	not recommended; data integrity may be compromised
<i>dsnhddecP</i> :	USCCSID (367 for single-byte), UMCCSID (1208 for mixed), UGCCSID (1200 for graphic)

Accept the default CCSID for Unicode.DB2 currently allows specification of only CCSID 1208 for this value. DB2 automatically chooses the CCSIDs for double-byte and single-byte data. Do not change CCSID values after they have been specified. SQL results might be unpredictable if you do not accept the default.

## DEF ENCODING SCHEME field (ENSCHHEME DECP value)

The ENSCHHEME DECP value specifies the default format in which data is to be stored in DB2.

Acceptable values:	EBCDIC, ASCII, UNICODE
Default:	EBCDIC
Update:	not recommended
<i>dsnhddecP</i> :	ENSCHHEME

If you set DEF ENCODING SCHEME to ASCII or EBCDIC and MIXED DATA is set to YES, specify a mixed CCSID.

The DDL uses the default encoding scheme in the following cases:

- CREATE DATABASE
- CREATE DISTINCT TYPE
- CREATE FUNCTION
- CREATE GLOBAL TEMPORARY TABLE
- DECLARE GLOBAL TEMPORARY TABLE
- CREATE TABLESPACE (in DSNDB04 database)

## APPLICATION ENCODING field (APPENSCH DECP value)

The APPENSCH DECP value determines the system's default application encoding scheme, which affects how DB2 interprets data coming into DB2.

For example, if your default application encoding scheme is set to 37, and your EBCDIC coded character is set to 500, DB2 converts all data coming into the system to 500 from 37 before using it. This includes, but is not limited to, SQL statement text and host variables.

Acceptable values:	ASCII, EBCDIC, UNICODE, or CCSID  (1 to 65533)
Default:	EBCDIC
Update:	not recommended
<i>dsnhddecP</i> :	APPENSCH

The following statements set the value of the host variable and do not require the package to be bound into the plan:



```

SET CURRENT PACKAGE SET = :HV ,
SET :HV = CURRENT PACKAGE SET ,
SET :HV = CURRENT PACKAGE PATH ,
SET CURRENT PACKAGE PATH = :HV

```

The host variable uses the system's default application encoding scheme, even when the application is bound with the ENCODING(EBCDIC/UNICODE) bind option.

The default value, EBCDIC, causes DB2 to retain the behavior of previous versions of DB2. (Assume that all data is in the EBCDIC system CCSID.)

## LOCALE LC\_CTYPE field (LC\_TYPE DECP value)

The LC\_TYPE DECP value specifies the system LOCALE LC\_CTYPE. A *locale* is the part of your system environment that depends on language and cultural conventions. An *LC\_CTYPE* is a subset of a locale that applies to character functions.

Acceptable values:	A valid locale of 0 to 50 characters.
Default:	Blank
Update:	not recommended
<i>dsnhdecpr</i> :	LC_TYPE

The UPPER, LOWER, and TRANSLATE scalar functions use the CURRENT LOCALE LC\_CTYPE system default or special register. The results of these functions can vary, depending on the setting of the locale.

**Recommendation:** Use the default value for LOCALE LC\_CTYPE unless you need to execute the UPPER, LOWER, or TRANSLATE functions for data that must be interpreted by using the rules provided by specific locales. For example, specify En\_US for English in the United States or Fr\_CA for French in Canada.

### Related reference:

- [➔ SET CURRENT LOCALE LC\\_CTYPE \(DB2 SQL\)](#)
- [➔ LC\\_CTYPE category \(XL C/C++ Programming Guide\)](#)

## DECFLOAT ROUNDING MODE field (DEF\_DECFLOAT\_ROUND\_MODE DECP value)

The DEF\_DECFLOAT\_ROUND\_MODE DECP value specifies the system default action that is to be used for rounding decimal floating point values.

Acceptable values:	ROUND_CEILING, ROUND_DOWN, ROUND_FLOOR, ROUND_HALF_DOWN, ROUND_HALF_EVEN, ROUND_HALF_UP, ROUND_UP
Default:	ROUND_HALF_EVEN
Update:	not recommended
<i>dsnhdecpr</i> :	DEF_DECFLOAT_ROUND_MODE

### ROUND\_CEILING

Rounds towards +infinity. If all of the discarded digits are zero or if the sign is negative, DB2 removes the discarded digits and the rest of the result remains the same. In all other cases, DB2 increments the result coefficient by 1.

#### **ROUND\_DOWN**

Rounds towards 0. DB2 ignores the discarded digits.

#### **ROUND\_FLOOR**

Rounds towards -infinity. If all of the discarded digits are zero or if the sign is positive, DB2 removes the discarded digits and the rest of the result remains the same. In all other cases, DB2 increments the result coefficient by 1.

#### **ROUND\_HALF\_DOWN**

Rounds to the nearest number. If the discarded digits are greater than 0.5 of the value of a one in the next left position, DB2 increments the result coefficient by 1. If the discarded digits are equal or less than 0.5, DB2 ignores the discarded digits.

#### **ROUND\_HALF\_EVEN**

Rounds to the nearest number. If the discarded digits are greater than 0.5, the value of a one in the next left position, DB2 increments the result coefficient by 1. If the discarded digits are less than 0.5, DB2 ignores the discarded digits. If the discarded digits are 0.5 and the rightmost digit is even, DB2 does not alter the result coefficient. If the discarded digits are 0.5 and the rightmost digit is odd, DB2 increments the result coefficient by 1 to make it an even digit.




#### **ROUND\_HALF\_UP**

Rounds to the nearest number. If the discarded digits are greater than or equal to 0.5 of the value of a one in the next left position, DB2 increments the result coefficient by 1. In all other cases, DB2 ignores the discarded digits.

#### **ROUND\_UP**

Rounds away from 0. If all of the discarded digits are zero, DB2 removes the discarded digits and the rest of the result remains the same. In all other cases, DB2 increments the result coefficient by 1.

#### **Related reference:**

-  [BIND and REBIND options for packages and plans \(DB2 Commands\)](#)
-  [SET CURRENT DECFLOAT ROUNDING MODE \(DB2 SQL\)](#)
-  [Syntax and options of the UNLOAD control statement \(DB2 Utilities\)](#)

---

## **DSNTIP4: Application programming defaults panel 2**

The DSNTIP4 panel is a continuation of the DSNTIPF panel, and it is used to set application programming default values. The values that you specify on this panel are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler.

The values that you specify on this panel can also be used as default values by other programs, such as QMF.

```

DSNTIP4          INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 2
====> _
Enter data below:


 1 MINIMUM DIVIDE SCALE ====> NO          NO or YES for a minimum of 3 digits
                                         to right of decimal after division
 2 DECIMAL ARITHMETIC  ====> DEC15        DEC15, DEC31, 15, 31 or DPP.S
 3 USE FOR DYNAMICRULES ====> YES        YES or NO
 4 DESCRIBE FOR STATIC ====> YES          Allow DESCRIBE for STATIC SQL. NO or YES
 5 DATE FORMAT         ====> ISO          ISO, JIS, USA, EUR, LOCAL
 6 TIME FORMAT         ====> ISO          ISO, JIS, USA, EUR, LOCAL
 7 LOCAL DATE LENGTH   ====> 0           10-254 or 0 for no exit
 8 LOCAL TIME LENGTH   ====> 0           8-254 or 0 for no exit
 9 IMPLICIT TIME ZONE  ====> CURRENT      Implicit time zone for TIMESTAMP values
                                         (CURRENT, SESSION , or -12:59 to +14:00)
10 STD SQL LANGUAGE    ====> NO          NO or YES
11 PAD NUL-TERMINATED  ====> NO          NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 33. Application programming defaults panel: DSNTIP4

**Related tasks:**

 Processing SQL statements (DB2 Application programming and SQL)

**Related reference:**

DSNTIPF: Application programming defaults panel 1

## MINIMUM DIVIDE SCALE field (DECDIV3 subsystem parameter)

The DECDIV3 subsystem parameter determines whether to retain at least three digits to the right of the decimal point after any decimal division.

Acceptable values:	YES, NO
Default:	NO
Update:	option 18 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DECDIV3

Certain accounting applications might need this option.

**YES** Retains at least three digits to the right of the decimal point after any decimal division.

**NO** Does not retain three digits to the right of the decimal point after decimal division. Use NO, the default, to accept the usual rules for decimal division in SQL.

**Related concepts:**

 Arithmetic with two decimal operands (DB2 SQL)

## DECIMAL ARITHMETIC field (DECARTH DECP value)

The DECARTH DECP value specifies the rules that are to be used when both operands in a decimal operation have precisions of 15 or less.

Acceptable values:	DEC15, DEC31, 15, 31, or DPPS
Default:	DEC15
Update:	not recommended; cannot be changed during migration
<i>dsnhddecp</i> :	DECARTH

#### **DEC15 or 15**

Specifies the rules that do not allow a precision greater than 15 digits.


#### **DEC31 or 31**

Specifies the rules that allow a precision of up to 31 digits. The rules for DEC31 are always used if either operand has a precision greater than 15. If you chose DEC15 for your previous installation, choosing DEC31 can produce different results for operations on existing data.

**DPPS** "PP" is either 15 or 31 and "S" is a number between 1 and 9. If the form "DPP.S" is used, "PP" represents the precision that is to be used with the rules that are used for DEC15 or DEC31, and "S" represents the minimum divide scale to use for division operations. The separator that is used in the form "DPP.S" can be either the "." or the "," character, regardless of the setting of the default decimal point. An error occurs if any other values are specified.

This installation option applies to dynamic SQL by becoming the initial value for the CURRENT PRECISION special register, and it provides the default for the DEC precompiler option. DEC15 is sufficient for most sites. Do not choose DEC31 unless you are certain that you need the extra precision. If you use DEC31, you are more likely to get a bind error, particularly in division operations.

#### **Related concepts:**

 Arithmetic with two decimal operands (DB2 SQL)

## **USE FOR DYNAMICRULES field (DYNRULS DECP value)**

The DYNRULS DECP value specifies whether DB2 is to use the application programming default values that are specified on this panel. The other option is to use the values of the DB2 precompiler options for dynamic SQL statements that are bound by using DYNAMICRULES bind, define, or invoke behavior.

Acceptable values:	YES or NO
Default:	YES
Update:	not recommended
<i>dsnhddecp</i> :	DYNRULS

**YES** DB2 uses the application programming defaults for these fields regardless of the DYNAMICRULES option:

- DECIMAL POINT IS
- STRING DELIMITER
- SQL STRING DELIMITER
- MIXED DATA
- DECIMAL ARITHMETIC

**NO** DB2 uses the DB2 precompiler values for dynamic SQL statements in plans or packages that are bound by using the DYNAMICRULES bind, define, or invoke behavior.

## DESCRIBE FOR STATIC field (DESCSTAT subsystem parameter)

The DESCSTAT subsystem parameter controls whether DB2 is to build a DESCRIBE SQL descriptor area (SQLDA) when binding static SQL statements. DESCRIBE SQLDAs allow DESCRIBE requests for static SQL statements to execute successfully.

Normally, a DESCRIBE request cannot be issued against a static SQL statement, with the following exceptions:

- In a distributed environment, where DB2 for z/OS is the server, and the requester supports extended dynamic SQL. In this scenario, a DESCRIBE request that is executed on an SQL statement in the extended dynamic package appears to DB2 as a DESCRIBE on a static SQL statement in the DB2 package.
- When an application uses a stored procedure result set, and the application must allocate a cursor for that result set. The application can describe that cursor by using a DESCRIBE CURSOR statement. The SQL statement that is actually described is the one for which the cursor is declared in the stored procedure. If that statement is static, this requires that a static SQL statement must be described.

Acceptable values:	NO or YES
Default:	YES
Update:	option 18 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DESCSTAT

**NO** DB2 does not generate a DESCRIBE SQLDA at bind time for static SQL statements. If a DESCRIBE request is received at execution time, DB2 generates an error. However, if the describe request comes from a DESCRIBE CURSOR statement, DB2 satisfies the request but is able to provide only data type and length information. Column names are not provided.

**YES** DB2 generates a DESCRIBE SQLDA at bind time so that DESCRIBE requests for static SQL can be satisfied during execution. You must rebind the package after this value has been set to YES. Specifying YES increases the size of some packages because the DESCRIBE SQLDA is now stored with each statically bound SQL SELECT statement.

YES is the default value.

If your DB2 for z/OS subsystem or DB2 for Linux, UNIX, and Windows systems use the IBM Data Server Driver for JDBC and SQLJ, or if your DB2 for Linux, UNIX, and Windows systems use the CLI driver, you must set the DESCSTAT parameter to YES.

## DATE FORMAT field (DATE DECP value)

The DATE DECP value controls the default format that is to be used to represent dates in output.

Acceptable values:	ISO, USA, EUR, JIS, LOCAL
Default:	ISO
Update:	not recommended
<i>dsnhdecp</i> :	DATE


The date formats that are associated with the acceptable values for this field are shown in the table below.

*Table 53. Date formats*

Format name	Abbreviation	Format	Example
International Standards Organization	ISO	yyyy-mm-dd	2003-12-23
IBM USA standard	USA	mm/dd/yyyy	12/23/2003
IBM European standard	EUR	dd.mm.yyyy	23.12.2003
Japanese Industrial Standard Christian Era	JIS	yyyy-mm-dd	2003-12-23
Locally defined (by an installation exit routine)	LOCAL	your choice	

DB2 accepts dates in any format as input. DB2 interprets the input date based on the punctuation, and then provides date output in the format that you specify for this parameter. If you use LOCAL, you must provide a date exit routine to perform date formatting.

**Related concepts:**

 [Date and time routines \(DB2 Administration Guide\)](#)

## TIME FORMAT field (TIME DECP value)

The value of the TIME FORMAT field specifies which format is to be used as a default output to represent times.

Acceptable values:	ISO, USA, EUR, JIS, LOCAL
Default:	ISO
Update:	not recommended
<i>dsnhddec</i> :	TIME

*Table 54. Time formats*

Format name	Abbreviation	Time format	Example
International Standards Organization <sup>1</sup>	ISO <sup>1</sup>	hh.mm.ss	13.30.05
IBM USA standard	USA	hh:mm AM or PM	1:30 PM
IBM European standard	EUR	hh.mm.ss	13.30.05
Japanese Industrial Standard Christian Era	JIS	hh:mm:ss	13:30:05
Installation-defined	LOCAL	Any installation-defined form	—

**Note:** 1. This is an earlier version of the ISO format. JIS can be used to get the current ISO format.

In the USA format:

- The minutes can be omitted, thereby specifying 00 minutes. For example, 1 PM is equivalent to 1:00 PM.
- The letters A, M, and P can be lowercase.
- A single blank must precede the AM or PM.


- The hour must not be greater than 12 and cannot be 0 except for the special case of 00:00 AM.

Using the ISO format of the 24-hour clock, the correspondence between the USA format and the 24-hour clock is as follows:

- 12:01 AM through 12:59 AM correspond to 00.01.00 through 00.59.00.
- 01:00 AM through 11:59 AM correspond to 01.00.00 through 11.59.00.
- 12:00 PM (noon) through 11:59 PM correspond to 12.00.00 through 23.59.00.
- 12:00 AM (midnight) corresponds to 24.00.00.
- 00:00 AM (midnight) corresponds to 00.00.00.

DB2 can accept a time in any format as input. DB2 interprets the input time based on the punctuation and then provides time output in the format that you specify for this parameter. If you use LOCAL, you must provide a time exit routine to perform time formatting.

**Related concepts:**

 [Date and time routines \(DB2 Administration Guide\)](#)

## LOCAL DATE LENGTH field (DATELEN DECP value)

If you use a locally defined date exit routine, the DATELEN DECP value defines the length of the longest field that is required to hold a date. To use your own default date format, you must also enter LOCAL for the DATE FORMAT field on panel DSNTIP4.

Acceptable values:	0, 10 to 254
Default:	0
Update or migrate:	not recommended
<i>dsnhdcp:</i>	DATELEN

Accept the default value of 0 if you want to use one of the IBM-supplied date formats (ISO, JIS, USA, or EUR). This value indicates that no user-defined date format exists in your system.

## LOCAL TIME LENGTH field (TIMELEN DECP value)

Accept the default value of 0 if you want to use one of the IBM-supplied time formats (ISO, JIS, USA, or EUR).

Acceptable values:	0, 8 to 254
Default:	0
Update or migrate:	not recommended
<i>dsnhdcp:</i>	TIMELEN

This indicates that no user-defined time format exists in your system. If you use a locally defined time exit routine, enter the length of the longest field that is required to hold a time. If you want your own time format to be the default, enter LOCAL for field 2 on this panel.

## IMPLICIT TIME ZONE field (IMPLICIT\_TIMEZONE DECP value)

The IMPLICIT\_TIMEZONE DECP value determines the implicit time zone that is to be used when a time zone is not provided. This parameter applies to DB2 table columns and routing parameters that are declared with TIMESTAMP WITH TIME ZONE data types.

Acceptable values: CURRENT, SESSION, -12:59 to +14:00  
Default: CURRENT  
Update: not recommended<sup>1</sup>  
*dsnhdecpr*: IMPLICIT\_TIMEZONE

<sup>1</sup>Given the way that the implicit time zone is defined, a query might return different results before and after the IMPLICIT\_TIMEZONE setting is changed. Or, if IMPLICIT\_TIMEZONE is set to SESSION and an application changes the value of SESSION TIME ZONE through a SET SESSION TIME ZONE statement, a query might also return a different result. These situations apply to both static and dynamic applications.

### CURRENT

Uses the setting of the CURRENT TIME ZONE special register as the implicit time zone. This is the default setting.

### SESSION

Uses the setting of the SESSION TIME ZONE special register as the implicit time zone.

### -12:59 to +14:00

Uses the value of the string as the implicit time zone. The format of the value is *th:tm*, where *th* is the time zone hour (-12 to +14), and *tm* is the time zone minute (00 to 59). This value is an offset of hours and minutes from the coordinated universal time (UTC). If the string does not indicate '+' or '-', a '+' value is assumed

## STD SQL LANGUAGE field (STDSQL DECP value)

The STD SQL LANGUAGE field specifies the SQL standard that is to be used in writing application programs. Specifically, the parameter specifies whether the SQL language conforms to the portions of the 1992 ANSI SQL standard that are implemented by DB2.

Acceptable values: YES, NO  
Default: NO  
Update: not recommended  
*dsnhdecpr*: STDSQL

**YES** The SQL language that is used in application programs conforms to the portions of the 1992 ANSI SQL standard that are implemented by DB2.

**NO** Programs are written in accordance with the SQL language that is defined by DB2.

## PAD NUL-TERMINATED field (PADNTSTR DECP value)

The PADNTSTR subsystem parameter determines whether output host variables that are nul-terminated strings are to be padded with blanks and a nul-terminator.

Acceptable values: NO, YES  
Default: NO  
Update: not recommended  
*dsnhdecpr*: PADNTSTR



- NO** Nul-terminated output host variables have the nul-terminator placed at the end of actual data that is returned in the host variable.
- YES** Nul-terminated output host variables have the nul-terminator placed at the end of the string, after the string has been padded with blanks from the end of the actual data to the length of the output host variable.

## DSNTIP8: Performance and optimization panel

The DSNTIP8 panel is a continuation of the DSNTIP4 panel. It is used to set application programming default values pertaining to performance and optimization.

```

DSNTIP8          INSTALL DB2 - PERFORMANCE AND OPTIMIZATION
====>  -

Enter data below:

 1 CURRENT DEGREE      ====> 1          1 or ANY
 2 CACHE DYNAMIC SQL   ====> YES         NO or YES
 3 OPTIMIZATION HINTS  ====> NO          Enable optimization hints. NO or YES
 4 MAX DEGREE          ====> 0          Maximum degree of parallelism. 0-254
 5 PARALLELISM EFFICIENCY====> 50       Efficiency of parallelism. 0-100
 6 IMMEDIATE WRITE     ====> NO          NO, YES
 7 EVALUATE UNCOMMITTED ====> NO          Evaluate uncommitted data. NO or YES
 8 SKIP UNCOMM INSERTS ====> NO          Skip uncommitted inserts. NO or YES
 9 CURRENT REFRESH AGE  ====> 0          0 or ANY
10 CURRENT MAINT TYPES  ====> SYSTEM    NONE, SYSTEM, USER, ALL
11 STAR JOIN QUERIES   ====> DISABLE  DISABLE, ENABLE, 1-32768
12 MAX DATA CACHING   ====> 20         0-512
13 PLAN MANAGEMENT     ====> EXTENDED OFF, BASIC, EXTENDED
14 PLAN MANAGEMENT SCOPE====> STATIC  ALL, STATIC, DYNAMIC
15 RANDOMIZE XML DOCID  ====> NO          NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 34. Performance and optimization panel: DSNTIP8

### CURRENT DEGREE field (CDSSRDEF subsystem parameter)

The CDSSRDEF subsystem parameter determines the default value that is to be used for the CURRENT DEGREE special register. The default value is used when a degree is not explicitly set in the SQL statement SET CURRENT DEGREE.

Acceptable values: 1, ANY  
 Default: 1  
 Update: option 19 on panel DSNTIPB  
 DSNZPxxx: DSN6SPRM CDSSRDEF

- 1** Specifies that when a query is dynamically prepared, the execution of that query will not use parallelism.  
 If this value is specified, DB2 does not use any optimization hints for parallelism.
- ANY** Specifies that when a query is dynamically prepared, the execution of that query can involve parallelism.

**Recommendation:** In almost all situations, accept the default value of 1. You should use parallelism selectively where it provides value, rather than globally.

Although parallelism can provide a substantial reduction in elapsed time for some queries with only a modest overhead in processing time, parallelism does not always provide the intended benefit. For some queries and in many other situations, query parallelism does not provide an improvement, or it uses too many resources. If you are using nearly all of your CPU, I/O, or storage resources, parallelism is more likely to cause degradation of performance. Use parallelism only where it is most likely to provide benefits.

## CACHE DYNAMIC SQL field (CACHEDYN subsystem parameter)

The CACHEDYN subsystem parameter controls whether prepared, dynamic SQL statements are to be cached for later use by eligible application processes.


Acceptable values:	YES, NO
Default:	YES
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM CACHEDYN
Security parameter:	Yes

**YES** Causes prepared, dynamic SQL statements to be cached in the EDM dynamic statement cache. If you specify YES, consider this usage when you calculate your EDM pool size. If you specify YES, you must also specify YES for the USE PROTECTION field on panel DSNTIPP.

**NO** Causes prepared, dynamic SQL statements to not be cached.

**Note:** This is a security-related parameter. When RACF authorization is used and this parameter is set, the changes that are made in RACF profiles are not immediately reflected. This setting might result in a user (cached AUTHID) being able to issue the dynamic statements until the cache is refreshed.

### Related tasks:

 Improving dynamic SQL performance (DB2 Performance)  
Calculating EDM pool space for the prepared-statement cache

### Related reference:

USE PROTECTION field (AUTH subsystem parameter)

### Related information:

 Dynamic Statement Cache (white paper)

## OPTIMIZATION HINTS field (OPTHINTS subsystem parameter)

The OPTHINTS subsystem parameter specifies whether DB2 applies various methods for influencing access path selection when static SQL statements are bound or dynamic SQL statements are prepared.

DB2 applies matching various methods for influencing access path selection for SQL statements only when the value of the OPTHINTS subsystem parameter is set to YES.

Examples of these methods include:

- Statement-level access paths.
- Statement-level optimization parameters.
- PLAN\_TABLE access path hints.

Acceptable values:	NO, YES
Default:	NO
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM OPTHINTS

If you accept the default value, you the methods are not applied and the statements are optimized normally.

When the value is set to YES, DB2 applies hints in the following situations:

- For rows in a PLAN\_TABLE instance that contain a value in the OPTHINT column that matches the value of the OPTHINT bind option or the CURRENT OPTIMIZATION HINT special register.
- For any instance of a statement whose application environment and text matches rows in the SYSIBM.SYSQUERY catalog table.

**Related tasks:**

- [Preparing to influence access paths \(DB2 Performance\)](#)
- [Influencing access path selection \(DB2 Performance\)](#)
- [Managing and preventing access path change \(DB2 Performance\)](#)

**Related reference:**

- [PLAN\\_TABLE \(DB2 Performance\)](#)
- [SYSIBM.SYSQUERY table \(DB2 SQL\)](#)
- [CURRENT OPTIMIZATION HINT \(DB2 SQL\)](#)
- [BIND and REBIND options for packages and plans \(DB2 Commands\)](#)

## MAX DEGREE field (PARAMDEG subsystem parameter)

The PARAMDEG subsystem parameter specifies the maximum degree of parallelism that is to be allowed for a parallel group. When you specify a value for this parameter, you limit the degree of parallelism so that DB2 cannot create too many parallel tasks that use virtual storage.


Acceptable values:	0 to 254
Default:	0
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM PARAMDEG

The default value of 0 means that DB2 will choose a maximum degree of parallelism that is based on the system configuration.

When optimization hints for parallelism are used, the value of the PARAMDEG subsystem parameter does not limit the degree of parallelism at bind time. However, the value of the PARAMDEG subsystem parameter is enforced at execution time. So, if the value of the PARAMDEG subsystem parameter is lower than the degree of parallelism that is specified at bind time, then the degree of parallelism is reduced at execution time.

**Related tasks:**

- [Enabling parallel processing \(DB2 Performance\)](#)
- [Disabling query parallelism \(DB2 Performance\)](#)

 Specifying optimization parameters at the statement level (DB2 Performance)

## PARALLELISM EFFICIENCY field (PARA\_EFF subsystem parameter)

The PARA\_EFF subsystem parameter controls the efficiency that DB2 assumes for parallelism when DB2 chooses an access path. The integer value that is used for this parameter represents a percentage efficiency.

Acceptable values:	0 – 100
Default:	50
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM PARA_EFF

### Related tasks:

 Tuning parallel processing (DB2 Performance)

## IMMEDIATE WRITE field (IMMEDWRI subsystem parameter)

The IMMEDWRI subsystem parameter determines when updates to group buffer pool-dependent buffers are to be written to the coupling facility.

Acceptable values:	YES, NO
Default:	NO
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6GRP IMMEDWRI

- YES** DB2 immediately writes the page to the coupling facility after the update occurs.
- NO** DB2 does not immediately write the change buffer to the coupling facility. Instead, DB2 waits until phase 1 of commit.

If either the IMMEDWRITE bind option or the IMMEDWRI subsystem parameter is set to YES, the value of the immediate write option at run time is also YES.

## EVALUATE UNCOMMITTED field (EVALUNC subsystem parameter)

The EVALUNC subsystem parameter controls whether predicate evaluation is to be allowed on uncommitted data of other transactions. This parameter applies only to stage 1 predicate processing that uses table access for queries with isolation level RS or CS. Table access includes table space scan, index-to-data access, and RID-list processing.

The EVALUNC subsystem parameter applies to predicates in queries, searched UPDATE statements, and searched DELETE statements.

EVALUNC does not apply to the following cases:

- To predicates in SQL statements that access the DB2 catalog or directory
- To data definition statements, such as DROP TABLESPACE, for which internal processes query catalog or directory tables

Acceptable values:	NO, YES
Default:	NO
Update:	option 19 on panel DSNTIPB

DSNZPxxx:

DSN6SPRM EVALUNC

**NO** Predicate evaluation occurs only on committed data (or on the application's own uncommitted changes). NO ensures that all qualifying data is always included in the answer set.

This is the default value.

**YES** Predicate evaluation can occur on uncommitted data of other transactions. With YES, data might be excluded from the answer set. Data that does not satisfy the predicate during evaluation but then, because of undo processing (ROLLBACK or statement failure), reverts to a state that does satisfy the predicate is missing from the answer set. A value of YES enables DB2 to take fewer locks during query processing. The number of avoided locks depends on:

- The query's access path
- The number of evaluated rows that do not satisfy the predicate
- The number of those rows that are on overflow pages

**Recommendation:** Specify YES to improve concurrency if your applications can tolerate returned data that might falsely exclude any data that would be included as the result of undo processing (ROLLBACK or statement failure).

Although the option influences whether predicate evaluation can occur on uncommitted data, it does not influence whether uncommitted data is returned to an application. Queries with isolation level RS or CS return only committed data. They never return the uncommitted data of other transactions, even if predicate evaluation occurs. If data satisfies the predicate during evaluation, the data is locked as needed, and the predicate is re-evaluated as needed before the data is returned to the application.

## SKIP UNCOMM INSERTS field (SKIPUNCI subsystem parameter)

The SKIPUNCI subsystem parameter specifies whether statements ignore a row that was inserted by another transaction if the row has not yet been detected as committed. A newly inserted row can be detected as committed only after the lock held on the row has been released.

Acceptable values: NO, YES  
Default: NO  
Update: option 19 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM SKIPUNCI

SKIP UNCOMM INSERTS applies only to statements running with row-level locking and read stability or cursor stability isolation level.





**NO** DB2 waits for the inserted row to be committed or rolled back. It then processes the row if the insert commits, or it moves on to find another row if the insert is rolled back. If a transaction performs one or more inserts, and then spawns a second transaction, specify NO for SKIP UNCOMM INSERTS if the first transaction needs the second transaction to wait for the outcome of the inserts.

This is the default value.

## YES

Until the lock held on a newly inserted row is released, DB2 behaves as though the newly inserted row has not yet arrived and the row is skipped. Specifying a value of YES offers greater concurrency than the default value of NO.

### Related tasks:

-  Accessing currently committed data to avoid lock contention (DB2 Performance)
-  Choosing a CURRENTDATA option (DB2 Performance)
-  Choosing an ISOLATION option (DB2 Performance)
-  Improving concurrency for applications that tolerate incomplete results (DB2 Performance)

### Related reference:

-  CONCURRENTACCESSRESOLUTION bind option (DB2 Commands)

## CURRENT REFRESH AGE field (REFSHAGE subsystem parameter)

The REFSHAGE subsystem parameter specifies the default value for the CURRENT REFRESH AGE special register. The default value is used when no value is explicitly set by using the SET CURRENT REFRESH AGE statement.

Acceptable values:	0, ANY
Default:	0
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM REFSHAGE

Accepting the default value of 0 disables query rewrite using deferred materialized query tables.

## CURRENT MAINT TYPES field (MAINTYPE subsystem parameter)

The MAINTYPE subsystem parameter specifies the default value for the CURRENT MAINTAINED TABLE TYPES FOR OPTIMIZATION special register. This value is to be used when no value is explicitly set by using the SQL statement SET CURRENT MAINTAINED TABLE TYPES FOR OPTIMIZATION.

Acceptable values:	NONE, SYSTEM, USER, ALL
Default:	SYSTEM
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MAINTYPE

### NONE

Does not allow query rewrite.

### SYSTEM

Allows query rewrite by using system-maintained materialized query tables (SYSTEM) when CURRENT REFRESH AGE is set to ANY.

**USER** Allows query rewrite by using user-maintained materialized query tables when CURRENT REFRESH AGE is set to ANY.

**ALL** Allows query rewrite by using both system-maintained and user-maintained materialized query tables.


## **STAR JOIN QUERIES field (STARJOIN subsystem parameter)**

The STARJOIN subsystem parameter specifies whether star join processing is to be enabled.

Acceptable values: DISABLE, ENABLE, 1 to 32768  
Default: DISABLE  
Update: option 19 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM STARJOIN

A value of 1 indicates that the fact table will be the largest table in a star join query that does not have fact/dimension ratio checking. A value of 2 to 32768 indicates that DB2 should use the ratio of the star join table and the largest dimension table.

### **Related concepts:**

 Star schema access (DB2 Performance)

### **Related reference:**

SJTABLES in macro DSN6SPRM

## **MAX DATA CACHING field (MXDTCACH subsystem parameter)**

The MXDTCACH subsystem parameter specifies the maximum amount of memory, in MB, that is to be allocated for data caching per thread.

Acceptable values: 0 - 512  
Default: 20  
Update: option 19 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM MXDTCACH

If you specify 0, DB2 does not use data caching during query execution. If you specify a value between 1 and 512, DB2 allocates memory from above the 2 GB bar pool up to the specified size for data caching.

### **Related concepts:**

 Nested loop join (METHOD=1) (DB2 Performance)

### **Related tasks:**

Calculating sort pool size

## **PLAN MANAGEMENT field (PLANMGMT subsystem parameter)**

The PLANMGMT subsystem parameter specifies which default plan management policy to use when the PLANMGMT option is not explicitly specified for the bind or rebind of a package.

Acceptable values: OFF, BASIC, EXTENDED  
Default: EXTENDED  
Update: option 19 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM PLANMGMT

**OFF**

DB2 does not store access path information for SQL queries.

**BASIC**

DB2 stores access path information for SQL queries in the repository. In addition, one old access path is retained. This access path is referred to as the PREVIOUS copy.

**EXTENDED**

DB2 stores access path information for SQL queries in the repository. In addition, two old access paths are retained. These access paths are referred to as the PREVIOUS and ORIGINAL copies. This is the default setting of the PLANMGMT subsystem parameter.

## PLAN MANAGEMENT SCOPE field (PLANMGMTSCOPE subsystem parameter)

The PLANMGMTSCOPE subsystem parameter specifies the default plan management scope to use when the PLANMGMTSCOPE option is not explicitly specified for the bind or rebind of a package.

The value in this field is meaningful only when the value of the PLAN MANAGEMENT field is BASIC or EXTENDED.

Acceptable values:	STATIC
Default:	STATIC
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM PLANMGMTSCOPE

**ALL**

DB2 stores access path information for static and dynamic SQL queries.

**STATIC**

DB2 stores access path information for only static SQL queries. This is the default value for the PLANMGMTSCOPE parameter.

**Related tasks:**

 Switching to previous access paths (DB2 Performance)

## RANDOMIZE XML DOCID field (XML\_RANDOMIZE\_DOCID subsystem parameter)

Specifies whether DB2 is to sequentially or randomly generate the DOCID values for XML columns.

This parameter does not affect existing tables that have XML columns. Those tables continue to generate DOCIDs in the order that was specified by XML\_RANDOMIZE\_DOCID when the table was created or in sequential order if the parameter was not specified.

Acceptable values:	NO, YES
Default:	NO
Update:	option 19 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP XML_RANDOMIZE_DOCID

**NO** DB2 generates the DOCID values for XML columns sequentially.



**YES** DB2 generates the DOCID values for XML columns randomly. Setting this parameter to YES can be beneficial for performance when concurrent inserts are expected.

Once a table starts to randomly generate DOCID values for XML columns, it cannot be changed to generate the value sequentially. Changing this parameter back to NO does not have any effect on tables that have had columns added with a randomized DOCID.

## DSNTIPI: IRLM panel 1

The entries on the DSNTIPI panel affect the installation of the internal resource lock manager (IRLM).

You must use one IRLM for each DB2 subsystem.

```

DSNTIPI          INSTALL DB2 - IRLM PANEL 1
====> _
Enter data below:


 1  INSTALL IRLM          ====> YES          IRLM is required for DB2. Should the
                                           IRLM distributed with DB2 be installed?
 2  SUBSYSTEM NAME       ====> IRLM          IRLM MVS subsystem name
 3  RESOURCE TIMEOUT     ====> 30           Seconds to wait for unavailable resource
 4  AUTO START           ====> YES          Start IRLM if not up. YES or NO
 5  PROC NAME            ====> IRLMPROC     Name of start procedure for IRLM
 6  TIME TO AUTOSTART    ====> 120         Time DB2 will wait for IRLM autostart
 7  U LOCK FOR RR/RS     ====> YES          Lock mode for update cursor with
                                           RR or RS isolation. YES or NO
 8  X LOCK FOR SEARCHED U/D ====> NO        Use X lock for searched updates or
                                           deletes. NO or YES or TARGET.
 9  START IRLM CTRACE   ====> NO          Start IRLM component traces at startup?
                                           NO or YES
10  IMS BMP TIMEOUT      ====> 4           Timeout multiplier for BMP. 1-254
11  DL/I BATCH TIMEOUT  ====> 6           Timeout multiplier for DL/I. 1-254
12  RETAINED LOCK TIMEOUT ====> 0         Retained lock timeout multiplier. 0-254
PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 35. IRLM panel 1: DSNTIPI

### Related concepts:

IRLM address space (IRLMPROC) storage requirements

 Performance monitoring and tuning for data sharing environments (DB2 Data Sharing Planning and Administration)

### Related reference:

DSNTIPJ: IRLM panel 2

## INSTALL IRLM field

The INSTALL IRLM field determines whether IRLM subsystem entries are to be provided in job DSNTIJMV and whether an IRLM procedure is to be built.

Acceptable values:	YES, NO
Default:	YES
Update:	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and CLIST input member. Then, execute DSNTIJUZ and restart DB2.
DSNZPxxx:	none

- YES** The required entries are provided, and the IRLM procedure is built. .
- NO** No IRLM procedure is produced. On installation panel DSNTIPJ, all values are ignored except the LOCKS PER TABLE(SPACE) field and the LOCKS PER USER field.

If you do not have a new IRLM procedure created, ensure that your old IRLM procedure is updated with any new keywords that were added.

## **SUBSYSTEM NAME field (IRLMSID subsystem parameter)**

The IRLMSID subsystem parameter specifies the name by which z/OS is to know the IRLM subsystem.

Acceptable values:	1 to 4 characters. First character must be A - Z, #, \$, or @. Other characters must be A - Z, 1 - 9, #, \$, or @.
Default:	IRLM
Update:	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and CLIST input member. Then, execute DSNTIJUZ and restart DB2.
DSNZPxxx:	DSN6SPRM IRLMSID

The name is used for communication between DB2 and the IRLM. This name is included in the z/OS subsystem table IEFSSNxx, where xx is the value of the SUBSYSTEM MEMBER field on installation panel DSNTIPM.

If you installed the IRLM for IMS, The IRLM name for DB2 must be different. Two IRLMs that reside in the same z/OS system must have unique z/OS subsystem names. If you already have IRLM installed, use the z/OS subsystem name for that IRLM. Otherwise, accept the default value, IRLM.

The associated IRLM PROC parameter is IRLMNM.

### **Related reference:**

COMMAND PREFIX field

## **RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)**

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

Acceptable values:	1 to 3600
Default:	30
Update:	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and CLIST input member. Then, execute DSNTIJUZ and restart DB2.
DSNZPxxx:	DSN6SPRM IRLMRWT

*Timeout* means that a lock request has waited for a resource (or for claims on a resource for a particular claim class to be released) longer than the number of seconds specified on this option. The value that is specified for this option must be a multiple of the DEADLOCK TIME on installation panel DSNTIPJ because IRLM uses its deadlock timer to initiate timeout detection and deadlock detection. This value is rarely the actual time. For data sharing, the actual timeout period is longer than the timeout value.

### **Related concepts:**

➞ Global timeout processing (DB2 Data Sharing Planning and Administration)

**Related tasks:**

➞ Specifying the amount of inactive time before a timeout (DB2 Performance)

**Related reference:**

DEADLOCK TIME field

DDLTOX in macro DSN6SPRM

## AUTO START field (IRLMAUT subsystem parameter)

The IRLMAUT subsystem parameter defines whether DB2 is to automatically start and stop the IRLM.

Acceptable values:	YES, NO
Default:	YES
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM IRLMAUT

**YES** When DB2 starts, it tries to start the IRLM if the IRLM is not already started. When DB2 stops, IRLM automatically stops if the IRLM was started by DB2. However, IRLM will not automatically terminate if it is defined with DISCONNECT IRLM = NO.

**NO** DB2 terminates if the IRLM is not started when DB2 comes up.

**Recommendation:** Use YES if you use the IRLM for only a single DB2 subsystem.

When IRLM initializes, it is registered with the z/OS automatic restart manager (ARM). IRLM deregisters from the ARM when the IRLM is shut down normally. When IRLM terminates, it sends DB2 the registration information so that DB2 can determine whether IRLM was terminated normally. DB2 then deregisters from the ARM to prevent unwanted restarts. Otherwise, IRLM might be restarted with DB2, if AUTO START is YES.

**Related concepts:**

IRLM names

**Related tasks:**

➞ Controlling the IRLM (DB2 Administration Guide)

## PROC NAME field (IRLMPROC subsystem parameter)

The IRLMPROC subsystem parameter specifies the name of the IRLM procedure that z/OS is to invoke if the AUTO START field is set to YES.

Acceptable values:	1 to 8 characters
Default:	IRLMPROC
Update:	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and CLIST input member. Then, execute DSNTIJUZ and restart DB2
DSNZPxxx:	DSN6SPRM IRLMPROC

The name that is specified in the PROC NAME field **cannot** be the same as the subsystem name that is specified in the SUBSYSTEM NAME field.

The procedure is created during installation or migration by job DSNTIJMV and is placed in SYS1.PROCLIB. You can review the procedure by examining DSNTIJMV.

## TIME TO AUTOSTART field (IRLMSWT subsystem parameter)

The IRLMSWT subsystem parameter specifies the IRLM wait time in seconds. This is the amount of time that DB2 is to wait for the IRLM to start during autostart. If the time expires, DB2 abends.

Acceptable values:	1 to 3600
Default:	120
Update:	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and CLIST input member. Then, execute DSNTIJUZ and restart DB2.
DSNZPxxx:	DSN6SPRM IRLMSWT

## U LOCK FOR RR/RS field (RRULOCK subsystem parameter)

When operations use repeatable read (RR) or read stability (RS) isolation levels to access a table, a specified locking method is used. The RRULOCK subsystem parameter specifies whether DB2 is to use U (UPDATE) locks or S (SHARE) locks.

Acceptable values:	YES, NO
Default:	YES
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RRULOCK

### YES

The lock mode for operations with RR or RS isolation levels is U. If your applications make frequent updates with repeatable-read isolation, the U-lock might provide greater concurrency than the S-lock. However, applications that require high concurrency are almost always more efficient if they use cursor stability (CS) isolation.

**NO** The lock mode for operations with RR or RS isolation levels is S. If the cursor in your applications includes the FOR UPDATE OF clause, but updates are infrequent, S-locks generally provide better performance.

### Related concepts:

- [How DB2 chooses lock types \(DB2 Performance\)](#)
- [The ISOLATION \(CS\) option \(DB2 Performance\)](#)
- [The ISOLATION \(RR\) option \(DB2 Performance\)](#)
- [The ISOLATION \(RS\) option \(DB2 Performance\)](#)

### Related tasks:

- [Improving concurrency for update and delete operations \(DB2 Performance\)](#)

### Related reference:

- [Locks acquired for SQL statements \(DB2 Performance\)](#)

## X LOCK FOR SEARCHED U/D field (XLKUPDLT subsystem parameter)

The XLKUPDLT subsystem parameter specifies the locking method that is to be used when DB2 executes a searched update or delete.

Acceptable values:	YES, NO, TARGET
Default:	NO
Update:	option 20 on panel DSNTIPI

**YES**

DB2 uses an X-lock on qualifying rows or pages. For ISOLATION(CS), the lock is released if the rows or pages are not updated or deleted. For ISOLATION(RS) or ISOLATION(RR), an X-lock is retained until the next commit point. A value of YES is beneficial in a data sharing environment when most or all searched updates and deletes use an index. If YES is specified and searched updates or deletes result in a table space scan, the likelihood of timeouts and deadlocks greatly increases.


**NO** DB2 uses an S- or U-lock when scanning for qualifying rows. For any qualifying rows or pages, the lock is upgraded to an X-lock before performing the update or delete. For non-qualifying rows or pages the lock is released if ISOLATION(CS) is used. For ISOLATION(RS) or ISOLATION(RR), an S-lock is retained on the rows or pages until the next commit point. Use this option to achieve higher rates of concurrency.

**TARGET**

DB2 combines YES and NO behavior. DB2 uses an X-lock on qualifying rows or pages of the specific table that is targeted by the update or delete statement. DB2 uses an S- or U-lock when scanning for rows or pages of other tables that are referenced by the query (for example, tables that are referenced only in the WHERE clause of the query). For non-qualifying rows or pages the lock is released if ISOLATION(CS) is used. For ISOLATION(RS) or ISOLATION(RR), an S-lock is retained on the rows or pages until the next commit point.

**Related tasks:**

 Disabling update locks for searched UPDATE and DELETE (DB2 Data Sharing Planning and Administration)

 Improving concurrency for update and delete operations (DB2 Performance)

**START IRLM CTRACE field**

The value of the START IRLM CTRACE field specifies whether the IRLM component traces are to be activated when IRLM is started. The DB2-provided IRLM procedure in DSNTIJMV is tailored according to this value.

Acceptable values:	NO, YES
Default:	NO
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	none

**NO** IRLM starts only the low-activity subtraces EXP, INT, and XIT.

**YES**

IRLM starts with all its subtraces active. Starting all IRLM subtraces has a slight impact on performance demand for ECSA storage, but it improves serviceability.


**IMS BMP TIMEOUT field (BMPTOUT subsystem parameter)**

The BMPTOUT subsystem parameter is used to determine the amount of time that an IMS BMP connection is to wait for a lock to be released. The value of this field is multiplied by the value specified in the RESOURCE TIMEOUT field to determine the wait time.

For example, if you use the default value, an IMS BMP connection can wait for a resource for four times as long as the resource timeout value. This option gives you flexibility in tuning your system to avoid timeouts.

Acceptable values:	1 to 254
Default:	4
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM BMPTOUT

**Related tasks:**

 [Setting installation options for wait times \(DB2 Performance\)](#)


## **DL/I BATCH TIMEOUT field (DLITOUT subsystem parameter)**

The DLITOUT subsystem parameter controls the number of resource timeout values that a DL/I batch connection is to wait for a lock to be released. The resource timeout value is specified in the RESOURCE TIMEOUT field.

Acceptable values:	1 to 254
Default:	6
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DLITOUT

For example, if you use the default value of 6, a DL/I batch application can wait 6 times the resource timeout value for a resource. This option gives you flexibility in tuning your system to avoid timeouts.

**Related tasks:**

 [Setting installation options for wait times \(DB2 Performance\)](#)

**Related reference:**

RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)

## **RETAINED LOCK TIMEOUT field (RETLWAIT subsystem parameter)**

When another DB2 subsystem in a data sharing group has failed, it can hold an incompatible lock on a resource. Locks that are held by failed DB2 members are called *retained locks*. The RETLWAIT subsystem parameter is used to calculate how long a transaction is to wait for a retained lock.

Acceptable values:	0 to 254
Default:	0
Update:	option 20 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RETLWAIT

This value is of importance only in a data sharing environment.

The value that you use is a multiplier that is applied to the normal timeout value of the connection. For example, imagine that the retained lock multiplier is 2. The timeout period for a call attachment connection that is waiting for a retained lock is  $1 * 2$  (1 for the normal CAF timeout period, 2 for the additional time that is specified for retained locks).

If you use the default value, 0, applications do not wait for incompatible retained locks. Instead, the lock request is immediately rejected, and the application receives a resource unavailable SQLCODE.

**Related concepts:**

 Retained locks (DB2 Data Sharing Planning and Administration)

---

## DSNTIPJ: IRLM panel 2

The entries on the DSNTIPJ panel affect several characteristics of IRLM time-sharing fields and other locking options.

The default values are adequate for most sites under ordinary conditions. DB2 and IRLM group names must start with a letter.

```
DSNTIPJ          INSTALL DB2 - IRLM PANEL 2
====> -
Enter data below:

 1 PAGE PROTECT          ====> YES      Page protect common modules (YES,NO)
 2 MAX STORAGE FOR LOCKS ====> 2160    Control block storage in MB (2048-102400)
 3 LOCKS PER TABLE(SPACE)====> 2000   Maximum before lock escalation (0-100M)
 4 LOCKS PER USER        ====> 10000   Max before resource unavailable (0-100M)
 5 DEADLOCK TIME         ====> 1       Detection interval (1-5 seconds or
                                     100-5000 milliseconds)

For DB2 data sharing ONLY enter data below:


 6 DEADLOCK CYCLE        ====> 1       Number of LOCAL cycles before GLOBAL
 7 MEMBER IDENTIFIER     ====> 1       Member ID for this IRLM (1-255)
 8 IRLM XCF GROUP NAME   ====> DXRGROUP Name of IRLM XCF group
 9 LOCK ENTRY SIZE       ====> 2       Initial allocation, in bytes (2,4,8)
10 NUMBER OF LOCK ENTRIES====> 0       Lock table entries (0-2048)
11 DISCONNECT IRLM      ====> YES      Disconnect automatically (YES, NO)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 36. IRLM panel 2: DSNTIPJ

**Related concepts:**

IRLM address space (IRLMPROC) storage requirements

 Performance monitoring and tuning for data sharing environments (DB2 Data Sharing Planning and Administration)

**Related reference:**

DSNTIPI: IRLM panel 1

## PAGE PROTECT field

The value of the PAGE PROTECT field specifies whether IRLM is to load its common storage modules into page-protected storage.

Acceptable values:	NO, YES
Default:	YES
Update:	edit IRLM start procedure
DSNZPxxx:	none

- NO** Indicates that common storage modules are to be loaded into CSA or ECSA without page protecting that memory.
- YES** Indicates that modules located in common storage are to be loaded into page-protected storage to prevent programs from overlaying the instructions. YES is recommended because it requires no additional overhead after the modules are loaded, and the protection can prevent code-overlay failures.

This is the default value.

The associated IRLM PROC parameter is PGPROT.

## MAX STORAGE FOR LOCKS field

The MAX STORAGE FOR LOCKS field specifies, in MB, the maximum amount of private storage above the 2 GB bar for the IRLM lock control block structure.

Acceptable values:	2048 to 102400
Default:	2160
Update:	edit IRLM start procedure
DSNZPxxx	none

This value becomes the setting of the MLMT parameter for the IRLM address space procedure. The IRLM address space procedure sets the z/OS MEMLIMIT value for the address space.

Ensure that you set this value high enough so that IRLM does not reach the limit. The value that you choose should provide space for possible retained locks. IRLM only gets storage as it needs it, so choose a large value. You can also change the value dynamically by using the z/OS command `MODIFY ir'lmproc,SET,MLT`.

The associated IRLM PROC parameter is MLMT.

### Related concepts:

Common service area storage requirements

### Related reference:

IRLM storage use

## LOCKS PER TABLE(SPACE) field (NUMLKTS subsystem parameter)

The NUMLKTS subsystem parameter specifies the default maximum number of page, row, or LOB locks that an application can hold simultaneously in a table or table space. If a single application exceeds the maximum number of locks in a single table or table space, lock escalation occurs.

Acceptable values:	0 to 104857600
Default:	2000
Update:	option 21 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM NUMLKTS

You can enter the number of locks as an integer or you can enter a value with a suffix of K or M. If you enter a value with a suffix of K, the number of locks is that value multiplied by 1024. If you enter a value with a suffix of M, the number of locks is that value multiplied by  $1024 \times 1024$ , or 1,048,576.



The value that you specify for this field must be less than the value that is specified for the LOCKS PER USER field (except when LOCKS PER USER is set to 0).

The value of the LOCKS PER TABLE(SPACE) field becomes the default value (SYSTEM) for the LOCKMAX clause of the SQL statements CREATE TABLESPACE and ALTER TABLESPACE. A value of 0 indicates that there is no limit to the number of data and row locks that a program can acquire.

**Recommendation:** Do not set the value to 0, because it can cause the IRLM to experience storage shortages.

**Related tasks:**

 Specifying a default value for the LOCKMAX option (DB2 Performance)

**Related reference:**

LOCKS PER USER field (NUMLKUS subsystem parameter)

 CREATE TABLESPACE (DB2 SQL)

 ALTER TABLESPACE (DB2 SQL)

## LOCKS PER USER field (NUMLKUS subsystem parameter)

The NUMLKUS subsystem parameter specifies the maximum number of page, row, or LOB locks that a single application can hold concurrently for all table spaces.

Acceptable values:	0 to 104857600
Default:	10000
Update:	option 21 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM NUMLKUS

You can enter the number of locks as an integer or you can enter a value with a suffix of K or M. If you enter a value with a suffix of K, the number of locks is that value multiplied by 1024. If you enter a value with a suffix of M, the number of locks is that value multiplied by  $1024 \times 1024$ , or 1,048,576.

The maximum number includes locks on data pages, LOBS and XMLS, and rows that the program acquires when it accesses table spaces. The limit applies to all table spaces that are defined with the LOCKSIZE PAGE, LOCKSIZE ROW, or LOCKSIZE ANY options. A value of 0 indicates that there is no limit to the number of data and row locks that a program can acquire.

DB2 assumes that each lock requires 540 bytes of storage. If you define referential constraints between values, you might want to select a higher value for this field.


To avoid exhausting the IRLM's storage for locks, follow these guidelines:

- Do not specify 0 or a very large value unless it is specifically required to run an application.
- Consider the design of your applications. Long-running applications, particularly those that perform row-level locking, have few or infrequent commit points, or use repeatable-read isolation may use substantial amounts of lock storage. You should perform frequent commits to release locks.

**Important:** These values are constraints for a single application. Each concurrent application can hold the maximum number of locks specified here.

Check panel DSNTIPC to ensure that the required storage for the IRLM does not exceed the available region size for the IRLM.

**Related tasks:**

 Specifying the maximum number of locks that a single process can hold (DB2 Performance)

## DEADLOCK TIME field

The DEADLOCK TIME field controls the amount of time for which local deadlock detection cycles are to run. A *deadlock* is a situation in which two or more requesters are waiting for resources that are held by another requester. *Deadlock detection* is the procedure that identifies deadlocks and its participants.

Acceptable values:	1 to 5, 100 to 5000
Default:	1
Update:	edit IRLM start procedure
DSNZPxxx:	none

DB2 interprets values between 1 and 5 as seconds and values between 100 and 5000 as milliseconds. Depending on the value that you enter, IRLM might substitute a smaller maximum value.

The associated IRLM PROC parameter is DEADLOK.

## DEADLOCK CYCLE field

The value of the DEADLOCK CYCLE field specifies the number of local deadlock cycles that must expire before the IRLM does global deadlock detection processing.

Acceptable values:	1
Default:	1
Update:	edit IRLM start procedure
DSNZPxxx:	none

The DEADLOCK CYCLE field is used only for DB2 data sharing.

The associated IRLM PROC parameter is DEADLOK.

## MEMBER IDENTIFIER field

The value of the MEMBER IDENTIFIER field specifies an ID number that uniquely names this IRLM member within an IRLM data sharing group.

Acceptable values:	1 to 255
Default:	1
Update:	edit IRLM start procedure
DSNZPxxx:	none

**Recommendation:** Correlate the IRLM member ID with the DB2 member name. For example, for DB2 member DSN1, specify an IRLM member ID of 1.

The IRLM ID that you specify does not relate directly to the limit of IRLM members that can be in the data sharing group. That limit is determined by the current hardware limits (32). If you edit the IRLMPROC directly, you can specify a value from 1 to 255.

This option is used only for DB2 data sharing.

The associated IRLM PROC parameter is IRLMID.

**Related information:**

 DB2 and related commands (DB2 Commands)

## IRLM XCF GROUP NAME field

The value of the IRLM XCF GROUP NAME field is the name that is to be used for the IRLM group. This name must be different from the DB2 group name.

Acceptable values:	1 to 8 characters
Default:	DXRGROUP
Update:	edit IRLM start procedure
DSNZPxxx:	none

**Recommendation:** Begin this name with DXR. All members in the DB2 group must have the same IRLM XCF group name.

This option is used only for DB2 data sharing.

To avoid names that IBM uses for its cross-system coupling facility (XCF) groups, the first character must be an uppercase letter J - Z unless the name begins with DXR. Do not use SYS as the first three characters, and do not use UNDESIG as the group name.

The associated IRLM PROC parameter is IRLMGRP

## LOCK ENTRY SIZE field

The value of the LOCK ENTRY SIZE field specifies the initial size, in bytes, of individual lock entries in the lock table portion of the lock structure.

Acceptable values:	2, 4, 8
Default:	2
Update:	edit IRLM start procedure
DSNZPxxx:	none

**Recommendation:** If you have seven or fewer members in your data sharing group, use the default value for the most efficient use of coupling lock structure space. If you have more than seven members, use a value of 4 to avoid an automatic rebuild for maximum connections.

DB2 converts the value for LOCK ENTRY SIZE to a corresponding value for the IRLM parameter MAXUSRS as shown in the table below.

*Table 55. Converting lock entry size to MAXUSRS values*

LOCK ENTRY SIZE	MAXUSRS value
2	7
4	23
8	32

## NUMBER OF LOCK ENTRIES field

The value of the NUMBER OF LOCK ENTRIES field specifies the number of lock table entries that are to be in the coupling facility lock structure.

Acceptable values:	1 to 2048
Default:	0
Update:	edit IRLM start procedure
DSNZPxxx:	none

This value must be a power of 2 in the range of 1 to 2048, with each increment representing 1,048,576 lock table entries. The default value, 0, indicates that IRLM is to determine the number of lock table entries based on the lock structure size that is specified in CFRM policy and the number of users (MAXUSRS). If you specify a value for lock structure size in CFRM policy that is greater than 2048 MB, IRLM limits the number of lock table entries to a maximum of 2048 MB. If you want to control the number of lock table entries, enter a non-zero value within the accepted range.

The number of lock table entries has a direct effect on cross-system extended services (XES) contention. You should therefore monitor this number to find the optimum values for your installation.

The associated IRLM PROC parameter is LTE.

## DISCONNECT IRLM field

The value of the DISCONNECT IRLM field determines whether IRLM is to automatically disconnect from the data sharing group when DB2 is not identified to it.

Acceptable values:	YES, NO
Default:	YES
Update:	edit IRLM start procedure
DSNZPxxx:	none

**YES** Causes IRLM to disconnect from the data sharing group when DB2 is stopped normally or it stops as the result of a DB2 failure.

If you specify YES for the DISCONNECT IRLM field and YES for the AUTO START field on panel DSNTIPI, stopping IRLM does not require manual intervention.

**NO** IRLM remains connected to the data sharing group even when DB2 is stopped. In this case, you must explicitly stop IRLM to bring it down.

This option has less impact on other systems when a DB2 fails because z/OS is not required to perform certain recovery actions that it normally performs when IRLM comes down. Specifying NO can also mean that DB2 restarts more quickly after a DB2 normal or abnormal termination because it does not have to wait for IRLM to rejoin the IRLM data sharing group.

The associated IRLM PROC parameter is SCOPE.

## DSNTIP6: DB2 utilities parameters panel 1

The fields on the DSNTIP6 panel configure the default behavior of enhancements to the BACKUP SYSTEM, RESTORE SYSTEM, RECOVER, and other utilities.

```
DSNTIP6          INSTALL DB2 - DB2 UTILITIES PARAMETERS 1
===>

Enter system-level backup options for RESTORE SYSTEM and RECOVER below:
 1 SYSTEM-LEVEL BACKUPS  ===> NO          As a recovery base: NO or YES
 2 RESTORE/RECOVER       ===> NO          From dump: NO or YES
 3 DUMP CLASS NAME       ===>           For RESTORE/RECOVER from dump
 4 MAXIMUM TAPE UNITS    ===> NOLIMIT    For RESTORE SYSTEM: NOLIMIT or 1-255
Enter default settings for the DB2 Utilities backup options below:
 5 FAST REPLICATION      ===> REQUIRED    DSScopy replication type for CHECK
                                       utilities: PREFERRED or REQUIRED
 6 FAST RESTORE          ===> PREFERRED  For RECOVERY: NONE, PREFERRED, REQUIRED
 7 FLASHCOPY PPRC        ===> REQUIRED    FLASHCOPY peer to peer remote copy:
                                       blank, NONE, PREFERRED, or REQUIRED
 8 DEFAULT TEMPLATE      ===> HLQ.&DB..&SN..N&DSNUM..&UQ.

 9 COPY                  ===> NO          Use FLASHCOPY defaults for COPY
10 LOAD                  ===> NO          Use FLASHCOPY defaults for LOAD
11 REORG TABLESPACE     ===> NO          Use FLASHCOPY defaults for REORG TS
12 REBUILD INDEX         ===> NO          Use FLASHCOPY defaults for REBUILD IX
13 REORG INDEX           ===> NO          Use FLASHCOPY defaults for REORG IX

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 37. DB2 utilities parameters panel 1: DSNTIP6

### SYSTEM-LEVEL BACKUPS field (SYSTEM\_LEVEL\_BACKUPS subsystem parameter)

The RECOVER utility uses image copies and concurrent copies for object-level recoveries. The SYSTEM\_LEVEL\_BACKUPS subsystem parameter specifies whether the RECOVER utility is to also use system-level backups as a recovery base for object-level recoveries.

Acceptable values: NO, YES  
Default: NO  
Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM SYSTEM\_LEVEL\_BACKUPS

Specify the default of NO if you do not take system-level backups with the BACKUP SYSTEM utility. Specify YES if you take system-level backups with the BACKUP SYSTEM utility.

**Related reference:**

 RECOVER (DB2 Utilities)

### RESTORE/RECOVER field (RESTORE\_RECOVER\_FROMDUMP subsystem parameter)

The RESTORE\_RECOVER\_FROMDUMP subsystem parameter controls whether the system-level backup for the RESTORE SYSTEM and the RECOVER utilities is to occur from the dump on tape.

Acceptable values: YES or NO  
Default: NO

Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM RESTORE\_ RECOVER\_FROMDUMP

**YES** System-level backup for the RESTORE SYSTEM and the RECOVER utilities occurs from the dump on tape.

**NO** System-level backup for the RESTORE SYSTEM and the RECOVER utilities occurs from the disk copy of the system-level backup.

You can override the setting of RESTORE/RECOVER by executing the RESTORE SYSTEM utility statement or the RECOVER utility statement with the FROMDUMP keyword.

## **DUMP CLASS NAME field (UTILS\_DUMP\_CLASS\_NAME subsystem parameter)**

A system-level backup can occur from a dump on tape or from a disk copy. For backups that occur from the dump on tape, the UTILS\_DUMP\_CLASS\_NAME subsystem parameter specifies the name of the DFSMSHsm dump class that is to be used.

Acceptable values: blank or a valid DFSMSHsm dump class name not exceeding 8 characters in length

Default: blank

Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM UTILS\_DUMP\_CLASS\_NAME

This dump class is to be used by the RECOVER utility and the RESTORE SYSTEM utility to restore objects from a system-level backup that has been dumped to tape. The setting for this field is applicable only when you specify YES in the RESTORE/RECOVER field on panel DSNTIP6. You can override the setting for DUMP CLASS NAME by executing the RESTORE SYSTEM utility statement or the RECOVER utility statement with the DUMPCLASS keyword.

### **Related concepts:**

 [Dump Tasks \(z/OS DFSMSHsm Storage Administration\)](#)

## **MAXIMUM TAPE UNITS field (RESTORE\_TAPEUNITS subsystem parameter)**

When the RESTORE SYSTEM utility restores a system-level backup that has been dumped to tape, it allocates a number of tape units or tape drives. The RESTORE\_TAPEUNITS subsystem parameter specifies the maximum number of tape units or tape drives that the RESTORE SYSTEM utility can allocate.

Acceptable values: NOLIMIT or 1 - 255

Default: NOLIMIT

Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM RESTORE\_TAPEUNITS

The default value, NOLIMIT, means that the RESTORE SYSTEM utility will allocate as many tape units as necessary to restore the system-level backup. You can override the setting for MAXIMUM TAPE UNITS by executing the RESTORE SYSTEM utility statement with the TAPEUNITS keyword.

## FAST REPLICATION field (CHECK\_FASTREPLICATION subsystem parameter)

The CHECK\_FASTREPLICATION parameter specifies the type of replication that DSS COPY uses to copy objects to shadow data sets when it is invoked by the DB2 CHECK utilities. The CHECK utilities can stipulate fast replication as PREFERRED or REQUIRED.

Acceptable values:	PREFERRED, REQUIRED
Default:	REQUIRED
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.CHECK_FASTREPLICATION

This parameter applies to the CHECK utilities in all DB2 modes (conversion mode through new-function mode)

### PREFERRED

The CHECK utilities direct DSS COPY to use fast replication only if FlashCopy<sup>®</sup> support is available.

### REQUIRED

The CHECK utilities force DSS COPY to use fast replication, ensuring that object copies occur as quickly as possible. This reduces the opportunity for resource contention and unavailability. This option causes CHECK utilities to fail if FlashCopy cannot be used.

### Related concepts:

 Subsystem parameters for refining DFSMSdss COPY operation with utilities (DB2 Utilities)

### Related tasks:

 Checking data consistency with the CHECK utilities (Managing Security)

## FAST RESTORE field (REC\_FASTREPLICATION subsystem parameter)

The REC\_FASTREPLICATION parameter specifies whether the RECOVER utility should use FlashCopy to recover from a FlashCopy image copy. This parameter applies only to DB2 10 new-function mode.

Acceptable values:	NONE, PREFERRED, REQUIRED
Default:	PREFERRED
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.REC_FASTREPLICATION

### NONE

The RECOVER utility uses standard I/O to restore a FlashCopy image copy.

### PREFERRED

The RECOVER utility uses FlashCopy to recover from a FlashCopy image copy if FlashCopy support is available.

### REQUIRED

The RECOVER utility forces the use of FlashCopy to recover from a FlashCopy image copy to ensure that recovery occurs as quickly as possible. This option causes RECOVERY to fail if FlashCopy cannot be used.

If you use BACKUP SYSTEM to create system-level backups, using FlashCopy for a restore might cause BACKUP SYSTEM to fail because bi-directional FlashCopy is not supported.

**Related concepts:**

 Subsystem parameters for refining DFSMSdss COPY operation with utilities (DB2 Utilities)

## FLASHCOPY PPRC field (FLASHCOPY\_PPRC subsystem parameter)

The FLASHCOPY\_PPRC subsystem parameter specifies the behavior for DFSMSdss FlashCopy requests when the target disk storage volume is the primary device in a peer-to-peer remote copy (Metro Mirror) relationship.

Specifically, FLASHCOPY\_PPRC determines the following:

- Whether DFSMSdss preserves mirroring while processing a DB2 utilities request
- Whether the target device pair is allowed to go to duplex pending state

The FLASHCOPY\_PPRC parameter applies to the CHECK DATA, CHECK INDEX, and CHECK LOB utilities in all DB2 modes (conversion mode through new-function mode). The parameter also applies to the COPY, REORG TABLESPACE, REORG INDEX, REBUILD INDEX, LOAD, and RECOVER utilities in new-function mode.

**Important:** Set this field to blank if PPRC is not available on the subsystem.

Acceptable values:	NONE, PREFERRED, REQUIRED, blank
Default:	REQUIRED
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.FLASHCOPY_PPRC

### NONE

DFSMSdss does not preserve mirroring while processing a DB2 utilities request, even if all the configuration requirements for preserving the mirror operation are met.

### PREFERRED

DFSMSdss allows a volume pair to go into duplex pending state while processing a DB2 utilities request only if it is required.

### REQUIRED

DFSMSdss does not permit a PPRC volume pair to go into duplex pending state while processing a DB2 utilities request.

**blank** No preserve mirror command is passed to DFSMSdss.

**Related concepts:**

 Subsystem parameters for refining DFSMSdss COPY operation with utilities (DB2 Utilities)

## DEFAULT TEMPLATE field (FCCOPYDDN subsystem parameter)

The FCCOPYDDN subsystem parameter defines the default value that is to be used for the FCCOPYDDN parameter of the FLASHCOPY option of DB2 utilities



control statements. This parameter applies to the COPY, LOAD, REBUILD INDEX, REORG INDEX, and REORG TABLESPACE utilities.

FCCOPYDDN specifies the template for deriving the data set name for the FlashCopy image copy.

FlashCopy technology can be used to create VSAM copies of objects almost instantaneously. It creates a separate data set for each piece of the object that is being copied. FlashCopy technology can also be used to recover the object if necessary, which reduces recovery time and therefore provides greater availability.

**Important:** You must replace “HLQ” in the default value with a high-level qualifier that is appropriate for your subsystem.

Acceptable values:	valid DB2 utilities template
Default:	HLQ.&DB..&SN..N&DSNUM..&UQ.
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM FCCOPYDDN

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

If you assign the FCCOPYDDN setting directly in DSNTIJUZ, you need to repeat each ampersand (&) character to conform with IBM High-Level Assembler rules. For example, you would need to assign the default value above as FCCOPYDDN=HLQ.&&DB..&&SN..N&&DSNUM..&&UQ. (notice the trailing period).

## **COPY field (FLASHCOPY\_COPY subsystem parameter)**

The value of the FLASHCOPY\_COPY parameter specifies whether the FLASHCOPY option of the COPY utility is to be used by default.

Acceptable values:	NO, YES
Default:	NO
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM FLASHCOPY_COPY

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

**NO** Specifies that the FLASHCOPY option of the COPY utility is not used by default.

### **YES**

Specifies that the COPY utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the DB2 data sets are on FlashCopy Version 2 DASD.

## **LOAD field (FLASHCOPY\_LOAD subsystem parameter)**

The value of the FLASHCOPY\_LOAD subsystem parameter specifies whether the FLASHCOPY option of the LOAD utility is to be used by default.

Acceptable values:	NO, YES
--------------------	---------

Default: NO  
Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM FLASHCOPY\_LOAD

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

**NO** Specifies that the FLASHCOPY option of the LOAD utility is not used by default.

**YES**

Specifies that the LOAD utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the DB2 data sets are on FlashCopy Version 2 DASD.

### **REORG TABLESPACE field (FLASHCOPY\_REORG\_TS subsystem parameter)**

The value of the FLASHCOPY\_REORG\_TS subsystem parameter specifies whether the FLASHCOPY option of the REORG TABLESPACE utility is to be used by default.

Acceptable values: NO, YES  
Default: NO  
Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM FLASHCOPY\_REORG\_TS

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

**NO** Specifies that the FLASHCOPY option of the REORG TABLESPACE utility is not used by default.

**YES**

Specifies that the REORG TABLESPACE utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the DB2 data sets are on FlashCopy Version 2 DASD.

### **REBUILD INDEX field (FLASHCOPY\_REBUILD\_INDEX subsystem parameter)**

The value of the FLASHCOPY\_REBUILD\_INDEX subsystem parameter specifies whether the FLASHCOPY option of the REBUILD INDEX utility is to be used by default.

Acceptable values: NO, YES  
Default: NO  
Update: option 22 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM FLASHCOPY\_REBUILD\_INDEX

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

**NO** Specifies that the FLASHCOPY option of the REBUILD INDEX utility is not used by default.

**YES**

Specifies that the REBUILD INDEX utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the DB2 data sets are on FlashCopy Version 2 DASD.

## REORG INDEX field (FLASHCOPY\_REORG\_INDEX subsystem parameter)

The value of the FLASHCOPY\_REORG\_INDEX subsystem parameter specifies whether the FLASHCOPY option of the REORG INDEX utility is to be used by default.

Acceptable values:	NO, YES
Default:	NO
Update:	option 22 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM FLASHCOPY_REORG_INDEX

This parameter applies to new-function mode only. The parameter is ignored in conversion mode (from both DB2 Version 8 and DB2 9) and enabling-new-function mode (from both DB2 Version 8 and DB2 9).

**NO** Specifies that the FLASHCOPY option of the REORG INDEX utility is not used by default.

**YES**

Specifies that the REORG INDEX utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the DB2 data sets are on FlashCopy Version 2 DASD.

---

## DSNTIP61: DB2 utilities parameters panel 2

The fields on the DSNTIP61 panel are used to configure the default behavior of various DB2 utilities.

```
DSNTIP61          INSTALL DB2 - DB2 UTILITIES PARAMETERS 2
====>

Enter other DB2 Utilities options below:
 1 TEMP DS UNIT NAME   ====> SYSDA   Device for temporary utility data sets
 2 UTIL TEMP STORCLAS  ====>          For temporary shadow data sets
                               by utilities
 3 STATISTICS HISTORY  ====> NONE    Default for collection of stats history
 4 STATISTICS ROLLUP   ====> YES    Allow statistics aggregation: NO or YES
 5 UTILITY TIMEOUT     ====> 6      Utility wait time multiplier
 6 UT SORT DS ALLOCATION ====> YES    Predictable sort disk space allocation
 7 IGNORE SORTNUM STMT ====> NO     Ignore SORTNUM keyword in UT stmt
 8 SET CHECK PENDING   ====> NO     Set inconsistent objects in CHECK
                               PENDING status: NO or YES
 9 UT DB2 SORT USE     ====> ENABLE  ENABLE/DISABLE utility use of DB2 Sort

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 38. DB2 utilities parameters panel 2: DSNTIP61

## TEMP DS UNIT NAME field (VOLTDEVT subsystem parameter)

The VOLTDEVT subsystem parameter specifies the device type or unit name that is to be used by the DB2 COPY CONCURRENT and CHECK utilities for dynamically allocating temporary data sets. Specifying a value for VOLTDEVT removes the need to specify the FILTERDDN DD in the utility job.

Acceptable values:	valid device type or unit name
Default:	SYSDA
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM VOLTDEVT

The temporary data sets are deleted when the utility execution is complete.

## UTIL TEMP STORCLAS field (UTIL\_TEMP\_STORCLAS subsystem parameter)

The UTIL\_TEMP\_STORCLAS subsystem parameter specifies the storage class that the CHECK INDEX, CHECK DATA, and CHECK LOB utilities are to use when allocating temporary shadow data sets. (These utilities allocate shadow data sets when you specify the SHRLEVEL CHANGE option.)

Acceptable values:	blank or a valid SMS management class name
Default:	blank
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM UTIL_TEMP_STORCLAS

The default value of blank indicates that the shadow data sets are to be defined in the same storage class as the production page set.

**Recommendation:** Specifying an explicit storage class for this subsystem parameter can improve performance, especially when the system uses paired disk volumes for peer to peer remote copy.

In a data sharing group, this parameter has group scope.

## STATISTICS HISTORY field (STATHIST subsystem parameter)

The STATHIST subsystem parameter specifies which inserts and updates are to be recorded in catalog history tables.

Acceptable values:	SPACE, NONE, ALL, ACCESSPATH
Default:	NONE
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM STATHIST

### SPACE

All inserts and updates that DB2 makes to space-related catalog statistics are recorded.

### NONE

None of the changes that DB2 makes in the catalog are recorded. NONE is the default value.


**ALL** All inserts and updates that DB2 makes in the catalog are recorded.

## ACCESSPATH

All inserts and updates that DB2 makes to ACCESSPATH-related catalog statistics are recorded.

### Related tasks:

 Collecting history statistics (DB2 Performance)

 Collecting statistics history (DB2 Utilities)

### Related reference:

 History statistics (DB2 Performance)

## STATISTICS ROLLUP field (STATROLL subsystem parameter)

The STATROLL subsystem parameter specifies whether the RUNSTATS utility is to aggregate the partition-level statistics, even though some parts might not contain data.

Acceptable values:	YES, NO
Default:	YES
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM STATROLL

For DB2 subsystems that have large partitioned table spaces and indexes, it is recommended that you specify YES for STATISTICS ROLLUP. Specifying YES for STATISTICS ROLLUP enables the aggregation of partition-level statistics and helps the optimizer to choose a better access path.

## UTILITY TIMEOUT field (UTIMOUT subsystem parameter)


The UTIMOUT subsystem parameter specifies how long, in number of resource values, that a utility or utility command is to wait for a resource. The utility or utility command waits until a lock or all claims on a resource of a particular claim class is released.

Acceptable values:	1 to 254
Default:	6
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM UTIMOUT

For example, if you use the default value of six, a utility can wait six times longer than an SQL application for a resource. This option allows utilities to wait longer than SQL applications to access a resource. For more information about setting the resource timeout for SQL applications, see the discussion of the RESOURCE TIMEOUT field on DSNTIPI.

The value of UTILITY TIMEOUT is used as the default value for the RETRY parameter of DB2 Utilities such as CHECK INDEX and online REBUILD INDEX.

### Related tasks:

 Specifying the amount of inactive time before a timeout (DB2 Performance)

### Related reference:

RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)

## UT SORT DATA SET ALLOCATION field (UTSORTAL subsystem parameter)

The UTSORTAL subsystem parameter specifies how sort work data sets are allocated when utilities are run. This parameter applies to the CHECK, LOAD, REBUILD, REORG, and RUNSTATS utilities.

Acceptable values: YES or NO  
 Default: YES  
 Update: option 23 on panel DSNTIPB  
 DSNZPxxx: DSN6SPRM UTSORTAL

### YES

The utility attempts to allocate the sort work data sets. To increase the possible degree of parallelism, the utility minimizes the number of sort work data sets that are used. If the SORTNUM clause is specified in the utility control statement and the IGNSORTN subsystem parameter is set to NO, the sort program is used to allocate the sort work data sets. The utility also does not allocate the work data sets if they are allocated in the JCL.

The following table illustrates the result of using UTSORTAL=YES in combination with the IGNSORTN subsystem parameter and the SORTNUM clause.

*Table 56. Results of using UTSORTAL=YES in combination with the IGNSORTN subsystem parameter and the SORTNUM clause*

UTSORTAL setting	IGNSORTN setting	SORTNUM specified?	Result
YES	NO	YES	The sort program is used to allocate the sort work data sets based on the SORTNUM specification. The estimate for the number of records to be sorted is determined from real-time statistics if they are available.
YES	NO	NO	The utility allocates the sort work data sets. The estimate for the number of records to be sorted is determined from real-time statistics if they are available.

Table 56. Results of using UTSORTAL=YES in combination with the IGNSORTN subsystem parameter and the SORTNUM clause (continued)

UTSORTAL setting	IGNSORTN setting	SORTNUM specified?	Result
YES	YES	YES, NO, or N/A	The utility allocates the sort work data sets. The estimate for the number of records to be sorted is determined from real-time statistics if they are available. Any SORTNUM specifications are ignored.

**NO** The sort program dynamically allocates the sort work data sets. The data sets are allocated according to the parameters that are specified in the SORTNUM and SORTDEVT clauses of the control statement if they are specified. Otherwise, the data sets are allocated according to the installation defaults of the sort program.

### IGNORE SORTNUM STMT field (IGNSORTN subsystem parameter)

The IGNSORTN subsystem parameter determines whether occurrences of the SORTNUM clause in utility control statements are to be ignored.

Acceptable values: YES or NO  
 Default: NO  
 Update: option 23 on panel DSNTIPB  
 DSNZPxxx: DSN6SPRM IGNSORTN

**YES** DB2 ignores any SORTNUM specifications in utility control statements, and utilities attempt to allocate the sort work data sets. This parameter can be set to YES only when YES is specified for the UTSORTAL subsystem parameter.

**NO** Any SORTNUM specifications in utility control statements are passed to the sort program. The SORTNUM specification is used to determine the number of sort work data sets to dynamically allocate.

### SET CHECK PENDING field (CHECK\_SETCHKP subsystem parameter)

The CHECK\_SETCHKP subsystem parameter specifies whether the CHECK DATA and CHECK LOB utilities are to place inconsistent objects in CHECK PENDING status.

Acceptable values: YES or NO  
 Default: NO  
 Update: option 23 on panel DSNTIPB  
 DSNZPxxx: DSN6SPRM CHECK\_SETCHKP

When the CHECK DATA and CHECK LOB utilities detect an inconsistency in an object, they write diagnostic messages and end with a return code. The return code

matches the return code that is associated with the diagnostic messages. If several messages have been issued, the highest return code is used.

**YES** The CHECK DATA and CHECK LOB utilities place inconsistent objects in CHECK PENDING status. If an object is in CHECK PENDING status, it is unavailable for further processing until you correct the inconsistency and rerun the CHECK utility. There is no impact if the CHECK utilities are running in mode SHRLEVEL CHANGE because the utilities are running on a shadow copy and a restrictive state is not set in this mode.

**NO** The CHECK DATA and CHECK LOB utilities do not place objects in CHECK PENDING status if an inconsistency is detected. If the object was already in CHECK PENDING status, it remains in that status.

To change the CHECK\_SETCHKP parameter without using the panel interface:

1. Edit member DSN6SPRM of the *prefix*.SDSNMACS library and locate the entry for CHECK\_SETCHKP.
2. Change the setting for CHECK\_SETCHKP and save your changes.
3. Run the first two steps of your customized copy of job DSNTIJUZ to rebuild your DB2 subsystem parameter (DSNZPxxx) module.
4. After rebuilding the DB2 subsystem parameter module, refresh the subsystem parameter module by issuing the SET SYSPARM command.

## UT DB2 SORT USE field (DB2SORT subsystem parameter)

The DB2SORT subsystem parameter specifies whether DB2 utilities are to use DB2 Sort for z/OS instead of DFSORT for utility sort processing when DB2 Sort for z/OS is installed.

Acceptable values:	ENABLE, DISABLE
Default:	ENABLE
Update:	option 23 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DB2SORT

### ENABLE

DB2 utilities use DB2 Sort for z/OS when it is installed. If DB2 Sort for z/OS is not installed, DFSORT is used instead.

### DISABLE

DB2 utilities use DFSORT for utility sort processing, regardless of whether DB2 Sort for z/OS is installed.

---

## DSNTIPP: Protection panel

The entries on the DSNTIPP panel are related to security matters.



```

DSNTIPP      INSTALL DB2 - PROTECTION
====> _

Enter data below:

1 ARCHIVE LOG RACF  ====> NO      RACF protect archive log data sets
2 USE PROTECTION   ====> YES      DB2 authorization enabled. YES or NO
3 PLAN AUTH CACHE  ====> 3072     Size in bytes per plan (0 - 4096)
4 PACKAGE AUTH CACHE ====> 5M     Global - size in bytes (0-10M)
5 ROUTINE AUTH CACHE ====> 5M     Global - size in bytes (0-10M)
6 AUTH EXIT LIMIT   ====> 10      Access control exit shutdown threshold

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 39. Protection panel: DSNTIPP


## ARCHIVE LOG RACF field (PROTECT subsystem parameter)

The PROTECT subsystem parameter specifies whether archive log data sets are to be protected with individual profiles with RACF when they are created.

Acceptable values:	YES, NO
Default:	NO
Update:	see “DSNTIPP: Protection panel” on page 406; not during migration
DSNZPxxx:	DSN6ARVP PROTECT

If you specify YES, RACF protection must be active for DB2. However, a value of YES also means that you cannot use RACF generic profiles for archive log data sets. In addition, RACF class TAPEVOL must be active if your archive log is on tape. Otherwise, the offload fails.

### Related concepts:

 [Managing access through RACF \(Managing Security\)](#)

## USE PROTECTION field (AUTH subsystem parameter)

The AUTH subsystem parameter controls whether DB2 is to check authorizations.

Acceptable values:	YES, NO
Default:	YES
Update:	option 24 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM AUTH
Security parameter:	Yes

**YES** Enables authorization checking in DB2.

If you specified YES for the value of CACHE DYNAMIC SQL on panel DSNTIP8, you must also specify YES for this value.

**Recommendation:** Specify YES.

**NO** Disables all authorization checking in DB2 and disables the GRANT statement. In this case, every privilege is granted to PUBLIC.

**Note:** This is a security-related parameter. If it is set to NO, individual grants cannot be performed and all privileges are granted to PUBLIC, which allows any user to access user data.

## PLAN AUTH CACHE field (AUTHCACH subsystem parameter)

The AUTHCACH subsystem parameter specifies the size (in bytes per plan) of the authorization cache that is to be used if no CACHESIZE is specified on the BIND PLAN subcommand.

Acceptable values:	0 to 4096 in multiples of 256
Default:	3072
Update:	option 24 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM AUTHCACH
Security parameter:	Yes


0 Specifies that no authorization cache is to be used.

### 256 to 4096 (integers in multiples of 256)

For an authorization cache, you need 32 bytes of overhead plus (8 bytes of storage times the number of concurrent users).

**Note:** This is a security-related parameter.

#### Related tasks:

 [Caching authorization IDs for plans \(Managing Security\)](#)

#### Related reference:

 [BIND PLAN \(DSN\) \(DB2 Commands\)](#)

## PACKAGE AUTH CACHE field (CACHEPAC subsystem parameter)

The CACHEPAC subsystem parameter determines the amount of storage in bytes to allocate for caching package authorization information for all packages on this DB2 member. The cache is stored in the DSN1DBM1 address space.

Acceptable values:	0 to 10M
Default:	5M
Update:	option 24 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM CACHEPAC
Security parameter:	Yes

**Note:** This is a security-related parameter. When RACF authorization is used and this parameter is set, the changes that are made in RACF profiles are not immediately reflected. This setting might result in a user (cached AUTHID) being able to run a package.

## ROUTINE AUTH CACHE field (CACHERAC subsystem parameter)

The CACHERAC subsystem parameter determines the amount of storage in bytes to allocate for caching routine authorization information for all routines on this DB2 member. Routines include stored procedures and user-defined functions.

Acceptable values:	0 to 10M
Default:	5M
Update:	option 24 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM CACHERAC
Security parameter:	Yes

**Note:** This is a security-related parameter. When RACF authorization is used and this parameter is set, the changes that are made in RACF profiles are not immediately reflected. This setting might result in a user (cached AUTHID) being able to invoke a routine or function.

## **AUTH EXIT LIMIT field (AEXITLIM subsystem parameter)**

The AEXITLIM subsystem parameter controls the number of abends of the DB2 access control authorization exit routine that are to be tolerated before it is shut down.

Acceptable values:	0 to 32767
Default:	10
Update:	option 24 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM AEXITLIM

After the exit routine shuts down, it can be reactivated only by restarting DB2. A very low setting for the AUTH EXIT LIMIT field might cause the exit routine to shut down in response to routine abends such as timeouts. A very high setting, on the other hand, may mask a problem with the exit routine environment that can result in degraded DB2 or system performance.

---

## **DSNTIPP1: Protection panel 2**

Use the DSNTIPP1 panel to specify security options, including the authorization IDs that are required for system administrators and system operators, and the authorization IDs or roles that are required for security administrators. You can also specify the authorization IDs that are to be used to install, configure, and validate DB2-supplied routines.

Because space on this panel is limited, some input fields are not wide enough to display the entire contents of the field at one time. These fields are defined as ISPF scrollable fields, which let you see the field contents. A less-than symbol (<) or a greater-than (>) symbol denotes a scrollable field. A > symbol indicates that the field can be scrolled to the right, and a < symbol indicates that the field can be scrolled to the left. You can position your cursor in the field and use ISPF scroll commands LEFT and RIGHT to scroll through the field. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter. (Alternatively, you can assign your PF keys to be the LEFT, RIGHT, and EXPAND commands.)

```

DSNTIPP1          INSTALL DB2 - PROTECTION PANEL 2
====> -
Enter data below:

 1 SYSTEM ADMIN 1  ==> SYSADM   Authid of system administrator
 2 SYSTEM ADMIN 2  ==> SYSADM   Authid of system administrator
 3 SYSTEM OPERATOR 1 ==> SYSOPR  Authid of system operator
 4 SYSTEM OPERATOR 2 ==> SYSOPR  Authid of system operator
 5 SECURITY ADMIN 1 ==> SECADM   > Authid or role of security administrator
 6 SEC ADMIN 1 TYPE ==> AUTHID   Security administrator type. AUTHID, ROLE
 7 SECURITY ADMIN 2 ==> SECADM   > Authid or role of security administrator
 8 SEC ADMIN 2 TYPE ==> AUTHID   Security administrator type. AUTHID,ROLE
 9 SEPARATE SECURITY ==> NO      SYSADM/SYSCTRL can perform GRANT/REVOKE
10 UNKNOWN AUTHID  ==> IBMUSER  Authid of default (unknown) user
11 RESOURCE AUTHID ==> SYSIBM   Authid of Resource Limit Table creator
12 BIND NEW PACKAGE ==> BINDADD  Authority required: BINDADD or BIND
13 DBADM CREATE AUTH ==> NO      DBA can create views/aliases for others
14 REVOKE DEP PRIV ==> SQLSTMT   Include dependent privileges on REVOKE
                                (NO, YES, or SQLSTMT)
15 ROUTINES CREATOR ==> SYSADM   Authid to create and bind DB2 routines
16 SEC DEF CREATOR  ==> SYSADM   Authid for routines w/ SECURITY DEFINER
                                (must be a primary authorization ID)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 40. Protection panel 2: DSNTIPP1

## SYSTEM ADMIN 1 field (SYSADM subsystem parameter)

The SYSADM subsystem parameter specifies the first of two authorization IDs that are to have installation SYSADM authority.

Acceptable values:	1 to 8 characters, the first of which must be an alphabetic character
Default:	SYSADM
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SYSADM
Security parameter:	Yes

The two users with installation SYSADM authority are permitted access to DB2 in all cases.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can manage the DB2 subsystem even when the DB2 catalog is unavailable. This authorization ID can access all user data and can run any application.

**Related reference:**

 Installation SYSADM (Managing Security)

## SYSTEM ADMIN 2 field (SYSADM2 subsystem parameter)

The SYSADM2 subsystem parameter specifies the second of two authorization IDs that are to have installation SYSADM authority.

Acceptable values:	1 to 8 characters, the first of which must be an alphabetic character
Default:	SYSADM
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SYSADM2

Security parameter: Yes

If you leave this field blank, the value is set to the value of the SYSTEM ADMIN 1 field.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can manage the DB2 subsystem even when the DB2 catalog is unavailable. This authorization ID can access all user data and can run any application.

## SYSTEM OPERATOR 1 field (SYSOPR1 subsystem parameter)

The SYSOPR1 subsystem parameter specifies the first of two authorization IDs that are to have installation SYSOPR authority.

Acceptable values: 1 to 8 characters, the first of which must be an alphabetic character  
Default: SYSOPR  
Update: option 25 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM SYSOPR1  
Security parameter: Yes

The two users with installation SYSOPR authority are permitted access to DB2 even if the DB2 catalog is unavailable.

The value of the SYSTEM OPERATOR 1 field or the SYSTEM OPERATOR 2 field is used for authorization during installation or migration if you install or migrate your DB2 subsystem without SYSADM authority.

If you leave this field blank, the value is set to the value of the SYSTEM ADMIN 1 field.

**Recommendation:** Set the value of this field or the value of the SYSTEM OPERATOR 2 field to SYSOPR. Doing so ensures that DB2 commands that are issued from the console can be processed correctly when the DB2 catalog is unavailable.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can issue most of the DB2 commands such as BIND QUERY, CANCEL THREAD, and STOP DB2. This ability might provide the authorization ID with information about user data. Also, the authorization ID can run the DSN1SDMP utility and terminate any utility job.

### Related reference:

 [Installation SYSOPR \(Managing Security\)](#)

## SYSTEM OPERATOR 2 field (SYSOPR2 subsystem parameter)

The SYSOPR2 subsystem parameter specifies the second of two system operators that are to have installation SYSOPR authority.

Acceptable values: 1 to 8 characters, the first of which must be an alphabetic character  
Default: SYSOPR  
Update: option 25 on panel DSNTIPB  
DSNZPxxx: DSN6SPRM SYSOPR2

Security parameter: Yes

The value of the SYSTEM OPERATOR 1 field or the SYSTEM OPERATOR 2 field is used for authorization during installation or migration if you install or migrate your DB2 subsystem without SYSADM authority.

If you leave this field blank, the value is set to the value of the SYSTEM OPERATOR 1 field.

**Recommendation:** Set the value of this field or the value of the SYSTEM OPERATOR 1 field to SYSOPR. Doing so ensures that DB2 commands that are issued from the console can be processed correctly when the DB2 catalog is unavailable.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can issue most of the DB2 commands such as BIND QUERY, CANCEL THREAD, and STOP DB2. This ability might provide the authorization ID with information about user data. Also, the authorization ID can run the DSN1SDMP utility and terminate any utility job.

## SECURITY ADMIN 1 field (SECADM1 subsystem parameter)

The SECADM1 subsystem parameter specifies the first of two authorization IDs or roles that are to have DB2 security administrator authority. In the SEC ADMIN 1 TYPE field, specify whether this entry is an authorization ID or a role.

Acceptable values: If SEC ADMIN 1 TYPE is AUTHID: 1 to 8 characters, starting with an alphabetic character.

If SEC ADMIN 1 TYPE is ROLE: an ordinary SQL identifier (up to 128 bytes) that designates a role. The role identifier cannot begin with "SYS" and cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, or SQLADM.

Default: SECADM

Update: option 25 on panel DSNTIPB

DSNZPxxx DSN6SPRM SECADM1


Security parameter: Yes

If you want to separate DB2 security administrator duties from system administrator duties for this subsystem, set at least one SECADM subsystem parameter to an authorization ID, or create the necessary trusted contexts and roles before setting the SEPARATE SECURITY field to YES. If you specify YES for SEPARATE SECURITY, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM subsystem parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects..

If the access control authorization exit routine (DSNX@XAC) is active, then the exit routine is called to check for SECADM authorization and this subsystem parameter is not checked.

**Note:** This is a security-related parameter. A user that has SECADM authority can manage security-related objects such as trusted contexts, roles, and column masks. The user can also grant privileges and revoke privileges that are granted by others.

**Related concepts:**

 Access control authorization exit routine (Managing Security)


**Related tasks:**

Installation step 9: Establish subsystem security (optional)

**Related reference:**

SEPARATE SECURITY field (SEPARATE\_SECURITY subsystem parameter)

**Related information:**

 Authorization IDs and roles (Managing Security)


## SEC ADMIN 1 TYPE field (SECADM1\_TYPE subsystem parameter)


The SECADM1\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 1 field is an authorization ID or a role.

Acceptable values:	AUTHID, ROLE
Default:	AUTHID
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SECADM1_TYPE
Security parameter:	Yes

**Note:** This is a security-related parameter. The value specifies whether the SECADM1 parameter is an authorization ID or a role. Changing the value of this field changes the SECADM1 parameter from an authorization ID to a role, or from a role to an authorization ID.

**Related information:**

 Authorization IDs and roles (Managing Security)

 Managing access through trusted contexts (Managing Security)

## SECURITY ADMIN 2 field (SECADM2 subsystem parameter)

The SECADM2 subsystem parameter specifies the second of two authorization IDs or roles that are to have DB2 security administrator authority. In the SEC ADMIN 2 TYPE field, specify whether this entry is an authorization ID or a role.

Acceptable values:	If SEC ADMIN 2 TYPE is AUTHID: 1 to 8 characters, starting with an alphabetic character.  If SEC ADMIN 2 TYPE is ROLE: an ordinary SQL identifier (up to 128 characters) that designates a role. The role identifier cannot begin with "SYS" and cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, or SQLADM.
Default:	SECADM
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SECADM2
Security parameter:	Yes


If you leave this field blank, the value is set to the value of the SECURITY ADMIN 1 field.

If you want to separate DB2 security administrator duties from system administrator duties for this subsystem, set at least one SECADM subsystem parameter to an authorization ID, or create the necessary trusted contexts and roles before setting the SEPARATE SECURITY field to YES. If you specify YES for SEPARATE SECURITY, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM subsystem parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects.

If the access control authorization exit (DSNX@XAC) is active, then the exit is called to check for SECADM authorization and this parameter is not checked.

**Note:** This is a security-related parameter. A user that has SECADM authority can manage security-related objects such as trusted contexts, roles, and column masks. The user can also grant privileges and revoke privileges that are granted by others.


**Related concepts:**

 [Access control authorization exit routine \(Managing Security\)](#)

**Related tasks:**

Installation step 9: Establish subsystem security (optional)

**Related information:**

 [Authorization IDs and roles \(Managing Security\)](#)


## SEC ADMIN 2 TYPE field (SECADM2\_TYPE subsystem parameter)


The SECADM2\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 2 field is an authorization ID or a role.

Acceptable values:	AUTHID, ROLE
Default:	AUTHID
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SECADM2_TYPE
Security parameter:	Yes

**Note:** This is a security-related parameter. The value specifies whether the SECADM2 parameter is an authorization ID or a role. Changing the value of this field changes the SECADM2 parameter from an authorization ID to a role, or from a role to an authorization ID.

**Related information:**

 [Authorization IDs and roles \(Managing Security\)](#)

 [Managing access through trusted contexts \(Managing Security\)](#)

## SEPARATE SECURITY field (SEPARATE\_SECURITY subsystem parameter)

The SEPARATE\_SECURITY subsystem parameter specifies whether DB2 security administrator duties are to be separated from system administrator duties for this subsystem.

Acceptable values:	NO, YES
Default:	NO



Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SEPARATE_SECURITY
Security parameter:	Yes

**NO** Overlaps DB2 security administrator duties and system administrator duties. If you are migrating and want SYSADM and SYSCTRL authorities to remain unchanged, use this setting. Users with SYSADM authority can manage all security objects, perform grants, and revoke privileges that are granted by others. Users with SYSCTRL authority can manage roles, perform most grants, and revoke privileges that are granted by others.

**YES**

Separates DB2 security administrator duties from system administrator duties. Users with SYSADM authority cannot manage security objects (such as roles and trusted contexts), perform grants, or revoke privileges granted by others. Users with SYSCTRL authority cannot manage roles, perform grants, or revoke privileges granted by others. However, existing grants made by users with SYSADM or SYSCTRL authority are unchanged. SECADM or ACCESSCTRL authority is required for security administration. The SEPARATE\_SECURITY subsystem parameter does not apply to or affect users with installation SYSADM authority.

Before setting SEPARATE SECURITY to YES, set at least one SECADM system parameter to an authorization ID, or create the necessary trusted contexts and roles. If you specify YES, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM system parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects.

**Note:** This is a security-related parameter.

**Related tasks:**

Installation step 9: Establish subsystem security (optional)

### UNKNOWN AUTHID field (DEFLTID subsystem parameter)

The DEFLTID subsystem parameter specifies the authorization ID that is to be used if RACF is not available for batch access and USER= is not specified in the JOB statement.

Acceptable values:	1 to 8 characters, the first of which must be an alphabetic character
Default:	IBMUSER
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DEFLTID

### RESOURCE AUTHID field (RLFAUTH subsystem parameter)

The RLFAUTH subsystem parameter specifies the authorization ID that is to be used if you plan to use the resource limit facility (governor).

Acceptable values:	1 to 8 characters
Default:	SYSIBM
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP RLFAUTH

## BIND NEW PACKAGE field (BINDNV subsystem parameter)


The BINDNV subsystem parameter controls whether BIND or BINDADD authority is to be required for a user to bind a new version of an existing package.

Acceptable values:	BINDADD, BIND
Default:	BINDADD
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM BINDNV
Security parameter:	Yes

If you accept the default, BINDADD, only users with the BINDADD system privilege are allowed to create a new package. If you specify BIND, users with the BIND privilege on a package or collection are allowed to create a new version of an existing package when they bind it. Users with PACKADM authority are also allowed to add a new package or a new version of a package to a collection.

**Note:** This is a security-related parameter. When this parameter is set to BIND, the BINDADD privilege check is bypassed, and a user with PACKADM authority can create new packages.

### Related reference:

 Privileges required for handling plans and packages (Managing Security)

## DBADM CREATE AUTH field (DBACRVW subsystem parameter)

The DBACRVW subsystem parameter controls whether an authorization ID with DBADM authority on a database is to be allowed to complete certain tasks.

Acceptable values:	NO, YES
Default:	NO
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM DBACRVW
Security parameter:	Yes

**NO** Does not allow authorization IDs with DBADM authority on a database to complete the following tasks:

- Create a view for another authorization ID on tables in that database.
- Create a materialized query table or alter a table to become a materialized query table for another authorization ID.
- Create an alias for itself or another authorization ID for a table in that database.

**YES** Allows authorization IDs with DBADM authority on a database to complete the following tasks:

- Create a view for another authorization ID on tables in that database.
- Create a materialized query table or alter a table to become a materialized query table for another authorization ID. This action requires that DBADM authority is held on the database in which the tables of the fullselect reside and that the authorization ID has DBADM authority on the database in which the materialized query table is to reside.
- Create an alias for itself or another authorization ID for a table in that database.

If you specify YES, an authorization ID with DBCTRL authority on a database can also create an alias for itself or for another authorization ID for a table in any database.

Specifying YES results in less need for SYSADM authority on a database. However, users that need full authority may still need to have SYSADM authority. Specifying YES does not allow an authorization ID with DBADM authority to grant authority on that view.

**Note:** This is a security-related parameter. It controls whether an authorization ID or role with DBADM authority on a database is to be allowed to create views, aliases, and materialized query tables for another authorization ID or role. If it is set to YES, authorization IDs and roles with DBADM authority on a database can give others access to user data.

## REVOKE DEP PRIV field (REVOKE\_DEP\_PRIVILEGES subsystem parameter)

The REVOKE\_DEP\_PRIVILEGES subsystem parameter controls whether revoking a privilege from a user is to cause dependent privileges to be revoked. If dependent privileges are to be revoked, revoking a privilege from a user also revokes the privilege from anyone that the user has granted that privilege to.

Acceptable values:	NO, YES, SQLSTMT
Default:	SQLSTMT
Update:	option 25 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM REVOKE_DEP_PRIVILEGES
Security parameter:	Yes

**NO** REVOKE statements do not include dependent privileges. An error occurs if a REVOKE statement contains the INCLUDING DEPENDENT PRIVILEGES clause.

### YES

REVOKE statements include dependent privileges, except when ACCESSCTRL, DATAACCESS, and system DBADM authorities are revoked. An error occurs if a REVOKE statement contains the NOT INCLUDING DEPENDENT PRIVILEGES clause, except when ACCESSCTRL, DATAACCESS, and system DBADM authorities are revoked.

### SQLSTMT

Allows revoking of dependent privileges to be controlled at the SQL level, as specified in REVOKE statements. DB2 recognizes the dependent privileges clause (INCLUDING DEPENDENT PRIVILEGES or NOT INCLUDING DEPENDENT PRIVILEGES) of the REVOKE statement

**Note:** This is a security-related parameter. If it is set to NO, privileges that were granted by a user are retained even if that user loses the authority that allowed the user to perform the grant.

## ROUTINES CREATOR field

The ROUTINES CREATOR field specifies the CURRENT SQLID setting that is to be used when creating, configuring, and validating most DB2 supplied routines. This field also specifies the default OWNER that is to be used when binding packages for these routines.

Acceptable values: 1 to 8 characters, the first of which must be an alphabetic character  
Default: SYSADM  
Update: option 25 on panel DSNTIPB  
DSNZPxxx: none

The value that you enter in the ROUTINES CREATOR field is assigned by the installation CLIST as the setting of the AUTHID parameter for installation programs DSNTRIN in job DSNTIJRT and DSNTRVfy in job DSNTIJRV.

The AUTHID parameter is used by the DSNTRIN program as the CURRENT SQLID setting when creating and configuring DB2 supplied routines. The DSNTRIN program also uses the AUTHID parameter as the default OWNER when binding packages for the DB2-supplied routines.

The AUTHID parameter is used by the DSNTRVfy program as the CURRENT SQLID setting when validating DB2 supplied routines. The DSNTRVfy program also uses the AUTHID parameter as the default OWNER when binding packages for validation of these routines.

**Recommendation:** Specify an authorization ID that has installation system administrator authority. Routines that are created or configured with installation system administrator authority are marked as system-defined.

**Related reference:**

 SYSIBM.SYSROUTINES table (DB2 SQL)

## SEC DEF CREATOR field

The SEC DEF CREATOR field specifies the CURRENT SQLID value for creating and configuring DB2-supplied routines that are defined with the SECURITY DEFINER option.

Acceptable values: 1 to 8 characters, the first of which must be an alphabetic character  
Default: SYSADM  
Update: option 25 on panel DSNTIPB  
DSNZPxxx: none

The value that you enter in the SEC DEF CREATOR field is assigned by the installation CLIST as the setting of the SECDEFID parameter for installation program DSNTRIN in job DSNTIJRT.

The SECDEFID parameter is used by the DSNTRIN program as the CURRENT SQLID setting when creating and configuring DB2-supplied routines that have the SECURITY DEFINER attribute. The default OWNER of any packages bound for the routines is specified in the INSTALL PKG OWNER field. If the INSTALL PKG OWNER field is not specified, the default OWNER is the value of the ROUTINES CREATOR field.

**Requirement:** Specify an ID that can be used as a logon ID because it will be used by WLM to execute routines that have the SECURITY DEFINER attribute.

**Related concepts:**

Job DSNTIJRT

Related reference:  
ROUTINES CREATOR field

## DSNTIPM: MVS PARMLIB updates panel

The entries on the DSNTIPM panel produce the DSNTIJMV job, which defines DB2 to z/OS and updates several PARMLIB members.

DSNTIJMV updates the following PARMLIB members:

- IEFSSN $xx$ , to define DB2 and IRLM as formal z/OS subsystems
- IEAAPF $xx$ , to authorize the *prefix*.SDSNLOAD, *prefix*.SDSNLINK, and *prefix*.SDSNEXIT libraries
- LNKLST $xx$ , to include the *prefix*.SDSNLINK library.

**Updating the parameters:** Different sites have different requirements for identifying DB2 to z/OS; as a result, the updates that DSNTIJMV makes to z/OS PARMLIB members might be incomplete. To ensure that the updates are complete, it is recommended that you edit the z/OS PARMLIB members directly when you install or migrate DB2. This is substantially easier than editing DSNTIJMV.

```
DSNTIPM          INSTALL DB2 - MVS PARMLIB UPDATES
====>

Check data and reenter to change:

1  SUBSYSTEM NAME      ==> DSN1      Name for connecting to DB2
2  COMMAND PREFIX     ==> -DSN1     DB2 subsystem command prefix
3  SUBSYSTEM MEMBER    ==> 00       xx in IEFSSNxx
4  SUBSYSTEM SEQUENCE ==> 88888888  Sequence number for insertion
5  AUTH MEMBER        ==> 00       xx in IEAAPFxx APF member name
6  AUTH SEQUENCE      ==> 88888888  Sequence number for insertion
7  LINK LIST ENTRY     ==> 00       xx in LNKLSTxx for DSNLINK
8  LINK LIST SEQUENCE ==> 88888888  Sequence number for insertion
9  COMMAND SCOPE      ==> STARTED  SYSTEM, SYSPLEX, or STARTED
10 SUPPRESS SOFT ERRORS ==> YES      Suppress logrec recording. Yes or No

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 41. MVS PARMLIB updates panel: DSNTIPM

### SUBSYSTEM NAME field (SSID DECP value)

The SUBSYSTEM NAME field specifies the z/OS subsystem name for DB2.

Acceptable values:	1 to 4 characters, the first of which must be a letter (A - Z), #, \$, or @. Others must be letters A - Z, integers 0 - 9, #, \$, or @.
Default:	DSN1
Update:	see below
<i>dsnhdecy</i> :	SSID

The name is used in member IEFSSN $xx$  of SYS1.PARMLIB.

If you specified a group attachment name in the GROUP ATTACH field on panel DSNTIPK, the SSID DECP value is set to that value.

*Updating the parameters:* Different sites have different requirements for identifying DB2 to z/OS; as a result, the updates that DSNTIJMV makes to z/OS PARMLIB members might be incomplete. To ensure that the updates are complete, you should edit the z/OS PARMLIB members directly when you install or migrate DB2. This is substantially easier than editing DSNTIJMV.

## COMMAND PREFIX field

The value of the COMMAND PREFIX field specifies the DB2 subsystem command prefix. When the prefix appears at the beginning of a command that is entered at a z/OS operator's console, z/OS passes the command to DB2 for processing. The command prefix is used in the DB2 entry of member IEFSSNxx of SYS1.PARMLIB.

Acceptable values:	1 to 8 characters; the first character must be a non-alphanumeric character.
Default:	-DSN1 (hyphen, concatenated with subsystem name)
Update:	see "DSNTIPM: MVS PARMLIB updates panel" on page 419
DSNZPxxx:	none

The first character of the command prefix must be a character from the table below. The remaining characters of the command prefix must be from the table below, letters A through Z, or numbers 0 through 9.

*Table 57. Allowable special characters for the command prefix*


Name	Character	Hexadecimal representation
cent sign	¢	X'4A'
period	.	X'4B'
less-than sign	<	X'4C'
plus sign	+	X'4E'
vertical bar		X'4F'
ampersand <sup>1</sup>	&	X'50'
exclamation point	!	X'5A'
dollar sign	\$	X'5B'
asterisk	*	X'5C'
right parenthesis	)	X'5D'
semi-colon	;	X'5E'
hyphen	-	X'60'
slash	/	X'61'
percent sign	%	X'6C'
underscore	_	X'6D'
question mark	?	X'6F'
colon	:	X'7A'
number sign	#	X'7B'
at sign	@	X'7C'
apostrophe <sup>2</sup>	'	X'7D'
equal sign	=	X'7E'
quotation marks	"	X'7F'

1. To use the ampersand (&), accept the default in this field, and then edit job DSNTIJMV to specify the ampersand as the command prefix.
2. To use the apostrophe ('), you must code two consecutive apostrophes in your IEFSSNxx member. For example, the entry for subsystem DB2A with a command prefix of 'DB2A and a scope of started looks like this:  
DB2A,DSN3INI, 'DSN3EPX, ' 'DB2A, '

Do not use the JES2 backspace character as a command prefix character. Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign “-” to one subsystem and “-DB2A” to another. Similarly, you cannot assign “?DB2” to one subsystem and “?DB2A” to another. However, you can assign “-DB2A” and “-DB2B” to different DB2 subsystems.

To use multiple-character command prefixes, have the system programmer update the IEFSSNxx subsystem definition statements in SYS1.PARMLIB.

**Related concepts:**

 Advantages of database access threads in INACTIVE mode (DB2 Performance)

## SUBSYSTEM MEMBER field

The value of the SUBSYSTEM MEMBER field specifies the last two characters (xx) of the name of member IEFSSNxx of SYS1.PARMLIB.

Acceptable values:	2 alphanumeric characters
Default:	00
Update:	see DSNTIPM: MVS PARMLIB updates panel
DSNZPxxx:	none

The subsystem member name indicates the available z/OS subsystems, including DB2 and IRLM.

## SUBSYSTEM SEQUENCE field

The SUBSYSTEM SEQUENCE field specifies a sequence number that is to be used for insertion. Use any number that is greater than the highest sequence number that is already used in the IEFSSNxx PARMLIB member.

Acceptable values:	1 to 99999993
Default:	88888888
Update:	see DSNTIPM: MVS PARMLIB updates panel
DSNZPxxx:	none

## AUTH MEMBER field

The value of the AUTH MEMBER field specifies the last two characters (xx) of the name of member IEAAPFxx of SYS1.PARMLIB. This member is to be used for authorized program facility (APF) authorization of the *prefix*.SDSNLOAD, *prefix*.SDSNLINK, and *prefix*.SDSNEXIT libraries.

Acceptable values:	2 alphanumeric characters
Default:	00

Update: see DSNTIPM: MVS PARMLIB updates panel  
DSNZPxxx: none

The specified data set must be APF-authorized. The member name must currently exist for the z/OS update job DSNTIJMV to work correctly.

You can use the PROGxx member instead of the IEAAPFxx member. In this case, you must manually name the PROGxx member because job DSNTIJMV does not do it for you.

## AUTH SEQUENCE field

The value of the AUTH SEQUENCE field is to be used as the sequence number for insertion in the IEAAPFxx PARMLIB member. Specify any number that is greater than the highest sequence number that is already used in the IEAAPFxx PARMLIB member.

Acceptable values: 1 to 99999995  
Default: 88888888  
Update: see DSNTIPM: MVS PARMLIB updates panel  
DSNZPxxx: none

## LINK LIST ENTRY field

The value of the LINK LIST ENTRY field specifies the last two characters of LNKLSTxx as needed to include the *prefix*.SDSNLINK library.

Acceptable values: 2 alphanumeric characters  
Default: 00  
Update: see "DSNTIPM: MVS PARMLIB updates panel" on page 419  
DSNZPxxx: none

## LINK LIST SEQUENCE field

The LINK LIST SEQUENCE field specifies the sequence number that is to be used for insertion. Use any number that is greater than the highest sequence number that is already used in the LNKLSTxx PARMLIB member.

Acceptable values: 1 to 99999999  
Default: 88888888  
Update: see DSNTIPM: MVS PARMLIB updates panel  
DSNZPxxx: none

## COMMAND SCOPE field

The value of the COMMAND SCOPE field controls whether the scope of the command prefix is to be one z/OS system or the entire Sysplex.

Acceptable values: SYSTEM, SYSPLEX, STARTED  
Default: STARTED  
Update: see DSNTIPM: MVS PARMLIB updates panel  
DSNZPxxx: none



## SYSTEM

Sets the scope of commands to one z/OS system. The command prefix is registered at z/OS IPL.

## SYSPLEX

Sets the scope of commands to the entire Sysplex. The command prefix is registered at z/OS IPL.

## STARTED

Sets the scope of commands to the entire Sysplex. The command prefix is registered at DB2 startup and unregistered when DB2 stops.

Although STARTED specifies a Sysplex scope, you can also use it for a DB2 subsystem in a non-data-sharing environment. Use STARTED if you intend to use the z/OS automatic restart manager, or if you might move this DB2 into a data sharing group.

## SUPPRESS SOFT ERRORS field (SUPERRS subsystem parameter)

The SUPERRS subsystem parameter specifies whether DB2 is to record errors such as invalid decimal data and arithmetic exceptions and issue SQLCODEs for them. This option enables or disables the recording of these errors in the operating system data set, SYS1.LOGREC.

Acceptable values:	YES, NO
Default:	YES
Update:	option 26 on panel DSNTIPB
DSNZPxxx:	SUPERRS

---

## DSNTIPL: Active log data set parameters

The entries on the DSNTIPL panel define characteristics of active log data sets.

*Performance note:* Several fields on this panel affect the DB2 use of logging. Be careful when you determine the values that are associated with fields on this panel. These values can greatly affect the performance of your DB2 subsystem.

```
DSNTIPL          INSTALL DB2 - ACTIVE LOG DATA SET PARAMETERS
====> -
Enter data below:

1 NUMBER OF LOGS   ====> 3          Number data sets per active log copy (2-31)
2 OUTPUT BUFFER   ====> 4000K       Size in bytes (400K-400000K)
3 ARCHIVE LOG FREQ ====> 24         Hours per archive run
4 UPDATE RATE     ====> 3600       Updates, inserts, and deletes per hour

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 42. Log data sets panel: DSNTIPL

### Related concepts:

 How the initial DB2 logging environment is established (DB2 Administration Guide)

## NUMBER OF LOGS field

The NUMBER OF LOGS field specifies the number of data sets that are to be established for each copy of the active log during installation.

Acceptable values:	2 to 93
Default:	3
Update:	cannot change during update or migration
DSNZPxxx:	none

You can later use the DSNJU003 utility to change the number of log data sets. If you use the DSNJU003 utility to modify the number of logs, your modified value is not reflected on this panel.

### Related tasks:

Updating subsystem parameters that cannot be updated by using DSNTIPB

## OUTPUT BUFFER field (OUTBUFF subsystem parameter)

The OUTPUT BUFFER field sets the OUTBUFF subsystem parameter, which specifies the size of the output buffer that is to be used for writing active log data sets.

Acceptable values:	409600 to 409600000, 400K to 400000K, or 1M to 390M (for OUTPUT BUFFER field) or 400 to 400000 (for OUTBUFF subsystem parameter)
Default:	4000K (for OUTPUT BUFFER field) or 4000 (for OUTBUFF subsystem parameter)
Update:	option 27 on panel DSNTIPB
DSNZPxxx:	DSN6LOGP OUTBUFF

If you use the installation CLIST, you can enter the OUTPUT BUFFER value in bytes (for example, 409600), use the abbreviation "K" for kilobytes (for example, 400K), or use the abbreviation "M" for megabytes (for example, 4M). However, if you update the OUTBUFF parameter directly, specify the setting only in kilobytes without "K" (for example, 400).

The larger the output buffer, the more likely that a log read request can return the required log records without needing I/O operations. This is a particularly important consideration if the DB2 subsystem is to be used with a data replication product that uses IFCID 306. In DB2 10, log buffers are permanently page-fixed. When you estimate real storage usage, you must use the entire size that you specify for the OUTBUFF parameter. To avoid page-fixing more storage than necessary, carefully choose the setting for OUTBUFF.

## ARCHIVE LOG FREQ field

The value of the ARCHIVE LOG FREQ field determines, in hours, the interval at which the active log is to be offloaded to the archive log.

Acceptable values:	1 to 200
Default:	24
Update:	cannot change during update
DSNZPxxx:	none

If you accept the default value of 24, the active log is offloaded approximately once each day.

## UPDATE RATE field

The value of the UPDATE RATE field specifies the estimated average number of inserts, updates, and deletes that are expected per hour in your subsystem.

Acceptable values:	1 to 16,777,216
Default:	3600
Update:	cannot change during update
DSNZPxxx:	none

You can use K (as in 32K) for multiples of 1024 bytes and M (as in 16M) for multiples of 1,048,576 bytes.

The size calculations in the DSNTINST CLIST assume that about 400 bytes of data are logged for each insert, update, and delete. The amount of data that is logged for these changes might be different at your site. Therefore, consider changing the size of the log data sets after you gain some experience with DB2 and have a better idea of how many bytes of data are logged for each change. Generally, if you have a subsystem that is tuned for maximum efficiency, you can expect to log about 10 GB of data per hour while processing several millions of updates and inserts.

Together, the UPDATE RATE and the ARCHIVE LOG FREQ (field 3) determine the size of the active logs.

---

## DSNTIPL1: Checkpoint parameters

The entries on the DSNTIPL1 panel define characteristics for log checkpoints.

```
DSNTIPL1          INSTALL DB2 - CHECKPOINT PARAMETERS
====>

Enter log checkpoint options:
 1 CHECKPOINT TYPE   ===> MINUTES   LOGRECS only, MINUTES only, or BOTH
 2 RECORDS/CHECKPOINT ===> NOTUSED   Log records per checkpoint
                                     - LOGRECS only: 1000 - 16000000
                                     - MINUTES only: NOTUSED
                                     - BOTH       : 1000 - 99999999
 3 MINUTES/CHECKPOINT ===> 5         Minutes per checkpoint:
                                     - LOGRECS only: NOTUSED
                                     - MINUTES only: 1 - 60
                                     - BOTH       : 1 - 1439
 4 UR CHECK FREQ     ===> 5         Checkpoints to enable UR check. 0-255
 5 UR LOG WRITE CHECK ===> 10K      Log Writes to enable UR check. 0-1000K
 6 LIMIT BACKOUT     ===> AUTO      Limit backout processing (AUTO, YES, NO,
                                     LIGHT, or LIGHTAUTO)
 7 BACKOUT DURATION  ===> 5         Checkpoints processed during backout if
                                     LIMIT BACKOUT is not NO (0-255)
 8 RO SWITCH CHKPTS  ===> 10        Checkpoints to read-only switch. 1-32767
 9 RO SWITCH TIME    ===> 10        Minutes to read-only switch. 1-32767
10 LEVELID UPDATE FREQ ===> ON      Checkpoints between updates. ON or OFF

PRESS: ENTER to continue RETURN to exit HELP for more information
```

## CHECKPOINT TYPE field (CHKTYPE subsystem parameter)

The CHKTYPE subsystem parameter indicates whether the interval between log checkpoints is to be based on the number of written log records, the time between checkpoints, or both.

Acceptable values:	LOGRECS, MINUTES, BOTH
Default:	MINUTES
Update:	option 28 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP CHKTYPE

The following values can be specified in the CHECKPOINT TYPE field on panel DSNTIPL1. If you run the installation or migration CLIST, the setting of the CHECKPOINT TYPE field determines the setting of the CHKTYPE subsystem parameter. The setting of the CHECKPOINT TYPE field also defines which settings are allowed in the RECORDS/CHECKPOINT and MINUTES/CHECKPOINT fields.

### LOGRECS

Log checkpoints occur after a certain number of log records are created, as specified by the CHKFREQ subsystem parameter. The CHKFREQ subsystem parameter is set through the RECORDS/CHECKPOINT field, and the CHKLOGR and CHKMINS subsystem parameters are both assigned a value of NOTUSED. When LOGRECS is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to SINGLE.

### MINUTES

Log checkpoints occur at an interval of a certain number of minutes, as specified by the CHKFREQ subsystem parameter. The CHKFREQ subsystem parameter is set through the MINUTES/CHECKPOINT field, and the CHKLOGR and CHKMINS subsystem parameters are both assigned a value of NOTUSED. When MINUTES is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to SINGLE.

**BOTH** Log checkpoints occur after a specified number of log records are created or after a specified number of minutes, whichever occurs first. The number of log records is specified by the CHKLOGR subsystem parameter and the number of minutes is specified by the CHKMINS subsystem parameter. These subsystem parameters are set through the RECORDS/CHECKPOINT and MINUTES/CHECKPOINT fields, respectively. The CHKFREQ parameter is assigned a value of NOTUSED. When BOTH is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to BOTH.

The following settings are valid for the CHKTYPE subsystem parameter:

### SINGLE

The DB2 subsystem uses the CHKFREQ subsystem parameter setting to determine one of the following numbers:

- The number of log records between checkpoints, if the setting is an integer from 1000 to 16000000. CHKFREQ settings from 200 to 999 are automatically increased to 1000.
- The number of minutes between checkpoints, if the setting is an integer from 1 to 60.

The CHKLOGR and CHKMINS subsystem parameters must both be set to NOTUSED.

**BOTH** Log checkpoints occur after a specified number of log records are created or after a specified number of minutes, whichever occurs first. The number of log records is specified by the CHKLOGR subsystem parameter and the number of minutes is specified by the CHKMINS subsystem parameter. The CHKFREQ subsystem parameter must be set to NOTUSED.

## RECORDS/CHECKPOINT field (CHKFREQ and CHKLOGR subsystem parameters)

The RECORDS/CHECKPOINT field determines the approximate number of log records that are to be created between scheduled log checkpoints.

Acceptable values: 1 000 - 16 000 000 (if CHECKPOINT TYPE is LOGRECS); NOTUSED (if CHECKPOINT TYPE is MINUTES); 1 000 - 99 999 999 (if CHECKPOINT TYPE is BOTH)

Default: NOTUSED

Update: option 28 on panel DSNTIPB

DSNZPxxx: DSN6SYSP.CHKFREQ and DSN6SYSP.CHKLOGR

- If the CHECKPOINT TYPE field is set to LOGRECS, then this field must contain an integer from 1 000 through 16 000 000. This integer is the number of log records that are created between checkpoints, and the value is assigned to the CHKFREQ parameter. The value NOTUSED is assigned to the CHKLOGR parameter.
- If the CHECKPOINT TYPE field is set to MINUTES, then this field must contain the value NOTUSED. The CHKFREQ parameter is assigned the value of the MINUTES/CHECKPOINT field, and the CHKLOGR parameter is assigned the value NOTUSED.
- If the CHECKPOINT TYPE field is set to BOTH, then this field must contain an integer from 1 000 through 99 999 999. This integer is the number of log records that are created between checkpoints, and the value is assigned to the CHKLOGR parameter. The value NOTUSED is assigned to the CHKFREQ parameter.
- If the CHECKPOINT TYPE field is set to BOTH, DB2 prevents log checkpoints from being taken too frequently and degrading performance. Log checkpoints are scheduled, but not necessarily immediately taken, when the number of log records reaches the value of CHKLOGR.

## MINUTES/CHECKPOINT field (CHKFREQ and CHKMINS subsystem parameters)

The MINUTES/CHECKPOINT field determines the approximate number of minutes that are to pass between scheduled log checkpoints.

Acceptable values: NOTUSED (if CHECKPOINT TYPE is LOGRECS); 1 - 60 (if CHECKPOINT TYPE is MINUTES); 1- 1439 (if CHECKPOINT TYPE is BOTH)

Default: 5

Update: option 28 on panel DSNTIPB

DSNZPxxx: DSN6SYSP.CHKFREQ and DSN6SYSP.CHKMINS

- If the CHECKPOINT TYPE field is set to LOGRECS, then this field must contain the value NOTUSED. The value of the RECORDS/CHECKPOINT field is assigned to the CHKFREQ parameter. The value NOTUSED is assigned to the CHKMINS parameter.
- If the CHECKPOINT TYPE field is set to MINUTES, then this field must contain an integer from 1 through 60. This integer is the number of minutes between log checkpoints, and the value is assigned to the CHKFREQ parameter. The value NOTUSED is assigned to the CHKMINS parameter.
- If the CHECKPOINT TYPE field is set to BOTH, then this field must contain an integer from 1 through 1439. This integer is the number of minutes between checkpoints, and the value is assigned to the CHKMINS parameter. The value NOTUSED is assigned to the CHKFREQ parameter.
- If the CHECKPOINT TYPE field is set to BOTH, DB2 prevents log checkpoints from being taken too frequently and degrading performance. Log checkpoints are scheduled, but not necessarily immediately taken, when the number of minutes that passes reaches the value of CHKMINS.

### **UR CHECK FREQ field (URCHKTH subsystem parameter)**

Unless the option is disabled, DB2 issues a warning message to the console for an uncommitted unit of recovery (UR) after a certain number of checkpoint cycles. The URCHKTH subsystem parameter specifies the number of checkpoint cycles that are to complete before DB2 issues the warning message.

Acceptable values:	0 to 255
Default:	5
Update:	option 28 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP URCHKTH

This option does not affect performance. If you use this option, specify a value that is based on how often a checkpoint occurs in your system and how much time you can allow for a restart or shutdown. For example, if your site's checkpoint interval is 5 minutes and the standard limit for issuing commits with units of recovery is 20 minutes, divide 20 by 5 to determine the best value for your system.

### **UR LOG WRITE CHECK field (URLGWTH subsystem parameter)**

Unless this option is disabled, DB2 issues a warning message to the console after log records are written by an uncommitted unit of recovery (UR). The URLGWTH subsystem parameter specifies the number of log records that are to be written before DB2 issues a warning message.

Acceptable values:	0 to 1000K
Default:	10K
Update:	option 28 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP URLGWTH

The purpose of this option is to provide notification of a long-running UR. Long-running URs might result in a lengthy DB2 restart or a lengthy recovery situation for critical tables. Specify the value in 1 K (1000 log records) increments. A value of 0 indicates that no write check is to be performed.

## LIMIT BACKOUT field (LBACKOUT subsystem parameter)

The LBACKOUT subsystem parameter specifies whether DB2 postpones backward-log processing for some units of work.

Acceptable values:	AUTO, YES, LIGHT, LIGHTAUTO, NO
Default:	AUTO
Update:	option 28 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP LBACKOUT

### AUTO

DB2 postpones some backout processing, but automatically starts the backout processing when DB2 restarts and begins acceptance of new work. When DB2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, DB2 ignores this setting and behaves as if LBACKOUT is set to NO.

**YES** DB2 postpones backout processing for some units of work until the RECOVER POSTPONED command is issued. When DB2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, DB2 ignores this setting and behaves as if LBACKOUT is set to NO.

### LIGHT

DB2 postpones backout processing for some units of work until the RECOVER POSTPONED command is issued. When DB2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, it creates but does not process postponed-abort units of recovery (URs). The URs are not processed until the RECOVER POSTPONED command is issued on a normal DB2 restart.

### LIGHTAUTO

DB2 postpones some backout processing, but automatically starts the backout processing when DB2 restarts and begins acceptance of new work. When DB2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, it creates but does not process postponed-abort URs. The postponed-abort URs are automatically processed after a normal DB2 restart.


**NO** Specifies that DB2 backward-log processing should process all inflight and in-abort units of recovery (URs).

If you specify AUTO, YES, LIGHT, or LIGHTAUTO, backout processing runs concurrently with new work. Sets or partitions with pending backout work are unavailable until their backout work is complete.

#### Related concepts:

 Restart light (DB2 Data Sharing Planning and Administration)

#### Related tasks:

 Deferring restart processing (DB2 Administration Guide)

#### Related reference:

 -START DB2 (DB2) (DB2 Commands)

BACKOUT DURATION field (BACKODUR subsystem parameter)

## BACKOUT DURATION field (BACKODUR subsystem parameter)

The BACKODUR subsystem parameter is used to calculate the number of log records that are to be backed out during a restart. This value is applied when the LIMIT BACKOUT field is set to AUTO, YES, LIGHT, or LIGHTAUTO.

Acceptable values:	0 to 255
Default:	5
Update:	option 28 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP BACKODUR

During a restart, backward-log processing continues until the following events occur:

- All inflight and in-abort URs with update activity against the catalog or directory are backed out.
- All inflight and in-abort URs that only update temporary tables are backed out.
- The number of processed log records equals the number specified in the BACKOUT DURATION field multiplied by the number of log records per checkpoint. If the CHECKPOINT TYPE field is set to LOGRECS or BOTH, the value of the RECORDS/CHECKPOINT field is used as the number of log records per checkpoint. If the CHECKPOINT TYPE field is set to MINUTES, the default value of 500000 is used as the number of log records per checkpoint.

Inflight and in-abort URs that are not completely backed out during restart are converted to postponed-abort status. Sets or partitions with postponed backout work are put into restart-pending (RESTP) state. This state blocks most access to the object. The exceptions are access by the RECOVER POSTPONED command state or by automatic backout processing that DB2 performs when the LIMIT BACKOUT field is set to AUTO or LIGHTAUTO.

A table space might be in restart-pending mode, without the associated index spaces also in restart-pending mode. This happens if a postponed-abort UR makes updates only to non-indexed fields of a table in a table space. In this case, the indexes are accessible to SQL (for index-only queries), even though the table space is inaccessible.

### Related tasks:

[↗](#) Deferring restart processing (DB2 Administration Guide)

[↗](#) Resolving postponed units of recovery (DB2 Administration Guide)

### Related reference:

CHECKPOINT TYPE field (CHKTYPE subsystem parameter)

LIMIT BACKOUT field (LBACKOUT subsystem parameter)

[↗](#) -RECOVER POSTPONED (DB2) (DB2 Commands)

### Related information:

## RO SWITCH CHKPTS field (PCLOSEN subsystem parameter)

The PCLOSEN subsystem parameter specifies the number of consecutive DB2 checkpoints that are to be allowed after a page set or partition is updated. After the specified number of checkpoints occur, DB2 converts the page set or partition from read-write to read-only.



Acceptable values: 1 to 32767  
Default: 10 (checkpoints)  
Update: option 28 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP PCLOSEN

This value is used in conjunction with the value of the RO SWITCH TIME field. If the condition for RO SWITCH TIME or RO SWITCH CHKPTS is met, the page set or partition is converted from read-write to read-only.

For NOT LOGGED table spaces, DB2 converts the page set or partition from read-write to read-only after one checkpoint, regardless of the value of RO SWITCH CHKPTS.

Having DB2 switch an infrequently updated set from read-write to read-only can be a performance benefit for recovery, logging, and for data sharing processing.

**Related tasks:**

Testing group buffer pool caching

## RO SWITCH TIME field (PCLOSET subsystem parameter)

The PCLOSET subsystem parameter specifies the number of minutes that can elapse after a page set or partition is updated. After the specified number of minutes, DB2 converts the set or partition from read-write to read-only.

Acceptable values: 1 to 32767  
Default: 10 (minutes)  
Update: option 28 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP PCLOSET

This value is used in conjunction with the value of the RO SWITCH CHKPTS field. If the condition for RO SWITCH CHKPTS or RO SWITCH TIME is met, the page set or partition is converted from read-write to read-only.

For NOT LOGGED table spaces, DB2 converts the page set or partition from read-write to read-only after one minute, regardless of the value of RO SWITCH TIME.

Having DB2 switch an infrequently updated page set from read-write to read-only can be a performance benefit for recovery, logging, and for data sharing processing.

**Related tasks:**

Testing group buffer pool caching

## LEVELID UPDATE FREQ field (DLDFREQ subsystem parameter)

The DLDFREQ subsystem parameter specifies whether the level ID of a page set or partition is to be updated at DB2-determined checkpoint intervals.

Acceptable values: ON, OFF  
Default: ON  
Update: option 28 on panel DSNTIPB  
DSNZPxxx: DSN6SYSP DLDFREQ

- |           ON     Level ID updates for down-level detection are enabled.
- |           OFF    Level ID updates for down-level detection are disabled.

---

## DSNTIPA: Archive log data set parameters panel

The entries on the DSNTIPA panel define the characteristics of archive log data sets.

*Updating the parameters:* You can update all the parameters on this panel by using their subsystem parameter name.

```

DSNTIPA          INSTALL DB2 - ARCHIVE LOG DATA SET PARAMETERS
====>
Enter data below:

 1 ALLOCATION UNITS  ==> BLK           Blk, Trk, or Cyl
 2 PRIMARY QUANTITY ==>              Primary space allocation
 3 SECONDARY QTY   ==>              Secondary space allocation
 4 CATALOG DATA   ==> NO           YES or NO to catalog archive data sets
 5 DEVICE TYPE 1   ==> TAPE         Unit name for COPY1 archive logs
 6 DEVICE TYPE 2   ==>              Unit name for COPY2 archive logs
 7 BLOCK SIZE      ==> 24576        Rounded up to 4096 multiple
 8 READ TAPE UNITS ==> 2           Number of allocated read tape units
 9 DEALLOC PERIOD  ==> 0           Time interval to deallocate tape units
10 RECORDING MAX   ==> 10000        Number of data sets recorded in BSDS
11 WRITE TO OPER   ==> YES         Issue WTOR before mount for archive
12 WTOR ROUTE CODE ==> 1,3,4
13 RETENTION PERIOD ==> 9999        Days to retain archive log data sets
14 QUIESCE PERIOD  ==> 5           Maximum quiesce interval (1-999)
15 COMPACT DATA   ==> NO         YES or NO for data compaction
16 SINGLE VOLUME   ==> NO         Single volume for disk archives. NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 43. Archive log data sets panel: DSNTIPA

### ALLOCATION UNITS field (ALCUNIT subsystem parameter)

The ALCUNIT subsystem parameter controls the units (blocks, tracks, or cylinders) in which primary and secondary space allocations are to be obtained.

Acceptable values:           BLK, TRK, or CYL  
Default:                       BLK  
Update:                        option 29 on panel DSNTIPB  
DSNZPxxx:                     DSN6ARVP ALCUNIT

### PRIMARY QUANTITY field (PRIQTY subsystem parameter)

The PRIQTY subsystem parameter specifies the amount of primary space that is to be allocated for archive log data sets. The units for this parameter are specified in the ALLOCATION UNITS field.

Acceptable values:           blank or 1 to 999999  
Default:                       blank (or calculated value--see note)  
Update:                        option 29 on panel DSNTIPB  
DSNZPxxx:                     DSN6ARVP PRIQTY

**Note:** The default value is blank, which is accepted when the ALLOCATION UNITS field is set to BLK. When the PRIMARY QUANTITY field is blank and the ALLOCATION UNITS field is set to BLK, the CLIST calculates the PRIQTY value as 4096 times the calculated size of the active log, divided by the specified BLOCK SIZE value.

By default, DFSMS Direct Access Device Space Management (DADSM) limits the space allocation on a single volume to less than 65535 tracks. Therefore, if the archive log data set size can be greater than or equal to 65535 tracks, you need to specify a primary space quantity of less than 65535 tracks. This action forces the archive log data set to extend to a second volume.

Alternatively, the archive log data sets can be allocated by a DFSMS data class that has a DSNMTYP (data set name type) setting of LARGE or EXT. In this case, you can specify a primary space quantity larger than 65535 tracks without extending to a second volume. LARGE indicates that data sets in the data class are to be allocated in large physical sequential format. EXT indicates that data sets in the data class are to be allocated in extended physical sequential format. A setting of EXT is recommended, and it is required for striping of data sets. If you specify EXT, also set the IFEXT (if extended) parameter to R (required) rather than P (preferred).

**Related concepts:**

Archive log data sets storage requirements

## SECONDARY QTY field (SECQTY subsystem parameter)

The SECQTY subsystem parameter specifies the amount of secondary space that is to be allocated for a disk data set. The units for this parameter are specified in the ALLOCATION UNITS field.

Acceptable values:	blank or 1 - 999999
Default:	blank
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP SECQTY

If you use the default, a blank, the CLIST calculates this space using block size and size of the log.

## CATALOG DATA field (CATALOG subsystem parameter)

The value of the CATALOG DATA field specifies whether archive log data sets on tape are to be cataloged.

Acceptable values:	YES, NO
Default:	NO
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP CATALOG

This option is meaningful only if you specify TAPE for the DEVICE TYPE 1 or DEVICE TYPE 2 field on panel DSNTIPA. The reason is that DB2 requires all archive log data sets that are allocated on disk to be cataloged.

If you choose to archive to disk, the CATALOG DATA field must be set to YES. If it is set to NO, you receive message DSNJ072E each time an archive log data set is allocated, although the DB2 subsystem still catalogs the data set.

**Recommendation:** If you archive to data sets on tape, set CATALOG DATA to YES.

Doing so allows the archive log data sets to be portable. DB2 accesses the archive logs through the catalog instead of the BSDS content that was written when the

archive was created. One advantage to cataloging archived tape data sets is evident when you perform operations like concurrent recovery. During such operations, for which the archive data sets must be shared and require faster devices, you can copy and recatalog the archive logs without modifying the BSDS.

**Important:** Setting CATALOG DATA to YES might prevent log read errors when the archive log data sets span multiple tape volumes. In this case, DB2 accesses the entire archive log data set through the catalog instead of using the individual volume information that is recorded in the BSDS.

## DEVICE TYPE 1 field (UNIT subsystem parameter)

The UNIT subsystem parameter specifies the device type or unit name that is to be used for storing archive log data sets.


Acceptable values:	device type or unit name
Default:	TAPE
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP UNIT

The value can be any alphanumeric string. If you choose to archive to disk, you can specify a generic device type with a limited volume range. DB2 requires all archive log data sets that are allocated on disk to be cataloged.

If the unit name specifies disk, the archive log data sets can extend to a maximum of 15 volumes. If the unit name specifies a tape device, DB2 can extend to a maximum of 20 volumes. If you chose to use disk, make the values of the PRIQTY and SECQTY subsystem parameters large enough to contain all of the data that comes from the active log data sets without extending beyond 15 volumes.

When archiving to disk, DB2 uses the number of online storage volumes for the specified UNIT name to determine a count of candidate volumes, up to a maximum of 15 volumes. If the archives are to be managed by SMS, do not use a storage class with the Guaranteed Space attribute. SMS attempts to allocate a primary extent on every candidate volume. This can result in allocation failures or unused space because the primary extent on each unused volume is not released when the archive data set is closed.

### Related concepts:

 [Archive log data sets \(DB2 Administration Guide\)](#)

### Related tasks:

Installation step 5: Define DB2 initialization parameters: DSNTIJUZ

### Related reference:

PRIMARY QUANTITY field (PRIQTY subsystem parameter)

SECONDARY QTY field (SECQTY subsystem parameter)

## DEVICE TYPE 2 field (UNIT2 subsystem parameter)

The UNIT2 subsystem parameter specifies the device type or unit name that is to be used for storing the second copy of archive log data sets. These data sets are the COPY2 data sets.

Acceptable values:	device type or unit name
Default:	none
Update:	option 29 on panel DSNTIPB

## BLOCK SIZE field (BLKSIZE subsystem parameter)

The BLKSIZE subsystem parameter determines the block size that is to be used for the archive log data set.

Acceptable values: 8192 to 28672  
 Default: 24576  
 Update: option 29 on panel DSNTIPB  
 DSNZPxxx: DSN6ARVP BLKSIZE

The block size must be compatible with the device type that you use for archive logs. The value is rounded up to the next multiple of 4096 bytes. You can also enter the value with a K; for example, 28K.

If the archive log is written to tape, use the largest possible block size to improve the speed of reading the archive logs. Use the table below as a guide.

*Table 58. Recommended block size values*

Archive log device	Block size
Tape	28672
3390 geometry disk	24576

## READ TAPE UNITS field (MAXRTU subsystem parameter)

The MAXRTU subsystem parameter specifies the maximum number of dedicated tape units that can be allocated to concurrently read archive log tape volumes.

Acceptable values: 1 to 99  
 Default: 2  
 Update: option 29 on panel DSNTIPB  
 DSNZPxxx: DSN6LOGP MAXRTU

This installation option, along with the DEALLOC PERIOD field, allows DB2 to optimize archive log reading from tape devices.

In a data sharing environment, the archive tape is not available to other members of the group until the deallocation period expires. You might not want to use this option in a data sharing environment unless all recover jobs are submitted from the same member.

**Recommendation:** Set the READ TAPE UNITS value to be at least one less than the number of tape units available to DB2. If you do otherwise, the OFFLOAD process could be delayed, which would affect the performance of your DB2 subsystem. For maximum throughput during archive log processing, specify the largest value possible for this option, remembering that you need at least one tape unit for offload processing. You can override this value by using the SET ARCHIVE command.

## DEALLOC PERIOD field (DEALLCT subsystem parameter)

The DEALLCT subsystem parameter determines the length of time that an archive read tape unit is to be allowed to remain unused before it is deallocated.

Acceptable values:	<i>minutes,seconds</i> , 1440, NOLIMIT
Default:	0
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6LOGP DEALLCT

***minutes,seconds***

Sets the amount of time before deallocation as the specified number of minutes (0 – 1440) and number of seconds (0 – 59). Separate the number of minutes and number of seconds with a comma and no spaces.

**1440** Sets the amount of time before deallocation to 1440 minutes.

**NOLIMIT**

Sets no limit on the amount of time before deallocation. Specifying NOLIMIT allows maximum optimization opportunities.

**Recommendation:** If you are not using data sharing and your archive log data is on tape, set this value high enough to allow DB2 to optimize tape handling for multiple read applications. When all tape reading is complete, you can update this option with the SET ARCHIVE command. If you are using data sharing, tapes should be deallocated quickly to avoid deadlocks. If DB2 is running in data sharing mode, it is strongly recommended that you use disk archive logs, not tape archive logs.

**Examples**

Assume that you want the deallocation period to be 30 seconds. Enter 0,30.

Assume that you want the deallocation period to be 23 minutes and 47 seconds. Enter 23,47.

**RECORDING MAX field (MAXARCH subsystem parameter)**

The MAXARCH subsystem parameter controls the maximum number of archive log volumes that are to be recorded in the BSDS.

Acceptable values:	10 to 10000
Default:	10000
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6LOGP MAXARCH

When this number is exceeded, recording resumes at the beginning of the BSDS.

You must create image copies of all DB2 objects, probably several times, before the archive log data sets are discarded. If you fail to retain an adequate number of archive log data sets for all the image copies, you might need to cold start or reinstall DB2. In both cases, data is lost.

**Related tasks:**

 [Managing the log \(DB2 Administration Guide\)](#)

**WRITE TO OPER field (ARCWTOR subsystem parameter)**

The ARCWTOR subsystem parameter controls whether DB2 is to send a message to the operator and wait for an answer before attempting to mount an archive log data set.

Acceptable values:	YES, NO
Default:	YES
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP ARCWTOR

Other DB2 users can be forced to wait while the mount is pending. They are not affected while DB2 is waiting for a response to the message.

**YES** Specifies that the system is to send a message to the operator before attempting to mount an archive log data set. Specify this value if you use a device for storing archive log data sets, such as tape, that requires long delays for mounts.

**NO** Specifies that the system will not send a message to the operator and wait for an answer before attempting to mount an archive log data set. Use this value if you use a device that does not have long delays for mounts.


The DEVICE TYPE 1 field specifies the device type or unit name.

## WTOR ROUTE CODE field (ARCWRTC subsystem parameter)

The ARCWRTC subsystem parameter identifies the list of route codes to be used in messages from the archive log data sets to the operator.

Acceptable values:	1 to 16 route codes. Specify at least one code. Separate multiple codes by commas only, with no blanks; for example: 1,3,5,7,9,10,11
Default:	1,3,4
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP ARCWRTC

### Related reference:

 [Routing Codes \(MVS System Messages\)](#)

 [Routing the Message \(z/OS MVS Assembler Services Guide\)](#)

## RETENTION PERIOD field (ARCRETN subsystem parameter)

The ARCRETN subsystem parameter specifies the retention period, which is the number of days that DB2 is to retain archive log data sets. The retention period is added to the current date to calculate the expiration date of the archive log data sets.

Acceptable values:	0 to 9999
Default:	9999
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP ARCRETN

The retention period is often used in tape management systems to control the reuse and scratching of data sets and tapes. DB2 uses the ARCRETN value as the value for the dynamic allocation parameter DALRETPD when archive log data sets are created.

The retention period set by the DFSMSdfp storage management subsystem (SMS) can be overridden by this DB2 parameter. Typically, the retention period is set to

the smaller value that is specified by either DB2 or SMS. The storage administrator and database administrator should agree on a retention period value that is appropriate for DB2.

**Important:** A wide variety of tape management systems exists, along with the opportunity for external manual overrides of retention periods. Consequently, DB2 does not have an automated method to delete the archive log data sets from the BSDS inventory of archive log data sets. Therefore, the information about an archive log data set might be in the BSDS after its retention period has expired. The information might be held long after the tapes have been scratched by a tape management system. Conversely, the maximum number of archive log data sets might be exceeded (see READ TAPE UNITS field). In such a case, the data from the BSDS might be dropped long before the data set reaches its expiration date.

**Related reference:**

 [DSNJU003 \(change log inventory\) \(DB2 Utilities\)](#)

## **QUIESCE PERIOD field (QUIESCE subsystem parameter)**

The QUIESCE subsystem parameter determines the maximum amount of time, in seconds, that DB2 is to be allowed to attempt a full system quiesce.

Acceptable values:	1 to 999
Default:	5
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP QUIESCE

This parameter requires some tuning. If you specify too short an interval, the quiesce period expires before a full quiesce is accomplished. If you specify too long an interval, the quiesce period might cause unnecessary DB2 lock contention and timeouts.

**Related tasks:**

 [Quiescing activity before offloading \(DB2 Administration Guide\)](#)

## **COMPACT DATA field (COMPACT subsystem parameter)**

The COMPACT subsystem parameter controls whether data that is written to archive logs is to be compacted.

Acceptable values:	YES or NO
Default:	NO
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP COMPACT

This option only applies to data that is written to a tape device that has the improved data recording capability (IDRC) feature. When this feature is turned on, hardware in the IDRC-compliant tape control unit uses several techniques to increase the amount of data that can be written on a tape. Specify NO if you do not want your data to be compacted or you do not use a tape device with the IDRC feature. Specify YES if you use a tape device with the IDRC feature and you want the data to be compacted.

**Recommendation:** Archive to disk and then use another facility, such as DFSMSHsm, to archive the archive log from disk to tape. Be aware that data that is



compressed to tape can only be read with a device that supports the IDRC feature. This could be a concern when you send archive tapes to another site for remote recovery.

## SINGLE VOLUME field (SVOLARC subsystem parameter)

When archiving to disk, DB2 uses the number of online storage volumes for the specified UNIT name to determine a count of candidate volumes, up to 15. The SVOLARC subsystem parameter specifies whether DB2 is to use a single volume for disk archives.

Acceptable values:	YES, NO
Default:	NO
Update:	option 29 on panel DSNTIPB
DSNZPxxx:	DSN6ARVP SVOLARC

Specify YES if you want DB2 to specify a unit and volume count of 1 when allocating a new archive log data set on disk. You may want to do this when SMS manages the archives.

---

## DSNTIPS: Databases and spaces to start automatically panel

The entries on the DSNTIPS panel name the databases, table spaces, and index spaces to restart automatically when you start DB2.

*Updating the parameters:* You can update all parameters on this panel by using their subsystem parameter name.

```

DSNTIPS          INSTALL DB2 - DATABASES AND SPACES TO START AUTOMATICALLY
===> _
Enter data below:

1  ===> RESTART      RESTART or DEFER the objects named below.
    The objects to restart or defer can be ALL in item 2, a database
    name, or database name.space name.

2  ==> ALL          14 ==>          26 ==>
3  ==>              15 ==>          27 ==>
4  ==>              16 ==>          28 ==>
5  ==>              17 ==>          29 ==>
6  ==>              18 ==>          30 ==>
7  ==>              19 ==>          31 ==>
8  ==>              20 ==>          32 ==>
9  ==>              21 ==>          33 ==>
10 ==>             22 ==>          34 ==>
11 ==>             23 ==>          35 ==>
12 ==>             24 ==>          36 ==>
13 ==>             25 ==>          37 ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 44. Databases and spaces to start automatically panel: DSNTIPS

## RESTART OR DEFER field (RESTART subsystem parameter)

The RESTART subsystem parameter determines whether DB2 is to restart or defer processing for the specified databases, table spaces, and index spaces when DB2 is started. The specified objects are those that are listed in fields 2 through 37 of panel DSNTIPS

Acceptable values:	RESTART, DEFER
Default:	RESTART
Update:	option 30 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RESTART

### RESTART

Causes DB2 to perform restart processing for the listed objects.

### DEFER

Causes DB2 not to perform restart processing for the objects.

## START NAMES field (ALL subsystem parameter)

The ALL subsystem parameter specifies the databases, table spaces, and index spaces that are to be restarted or deferred when DB2 starts. The value of the RESTART OR DEFER field determines whether the object is to be restarted or if the restart is to be deferred.

Acceptable values:	ALL, space names
Default:	ALL
Update:	option 30 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM ALL

### ALL

The restart or defer restart applies to all DB2 databases, table spaces, and index spaces. If you use this value, leave the remaining fields on the DSNTIPS panel blank. Use ALL in this field and DEFER in the RESTART OR DEFER field to defer recovery of all objects, including DB2 catalog objects. Trusted connections are not available if ALL is used in this field and DEFER is used in the RESTART OR DEFER field.

ALL is the default value.

#### <database name>


The restart or defer restart applies to all spaces in the database.

#### <table space or index space name> in the format database-name.space-name

The restart or defer restart applies to the individual table space or index space.

You can specify up to 36 object names on this panel. If you want to control restart processing for more than 36 objects, edit job DSNTIJUZ after you run the CLIST, and add the object names as ending positional parameters to macro DSN6SPRM. You can add up to 2500 object names in DSNTIJUZ.

#### Related tasks:

 [Deferring restart processing \(DB2 Administration Guide\)](#)

---

## DSNTIPR: Distributed data facility panel 1

The entries on the DSNTIPR panel control the starting of the distributed data facility (DDF). The entries on the DSNTIPR panel also specify location names that are used to connect another DB2 subsystem.

```

DSNTIPR          INSTALL DB2 - DISTRIBUTED DATA FACILITY PANEL 1
====> _

DSNT512I WARNING: ENTER UNIQUE NAMES FOR LUNAME AND LOCATION NAME
Enter data below:

 1 DDF STARTUP OPTION  ==> NO      NO, AUTO, or COMMAND
 2 DB2 LOCATION NAME   ==> LOC1     The name other DB2s use to
                                     refer to this DB2
 3 DB2 NETWORK LUNAME  ==> LU1     The name VTAM uses to refer to this DB2
 4 DB2 NETWORK PASSWORD ==>         Password for DB2's VTAM application
 5 RLST ACCESS ERROR   ==> NOLIMIT NOLIMIT, NORUN, or 1-5000000
 6 RESYNC INTERVAL     ==> 2       Minutes between resynchronization period
 7 DDF THREADS         ==> INACTIVE Status of a qualifying database access
                                     thread after commit. ACTIVE or INACTIVE.

 8 MAX INACTIVE DBATS  ==> 0       Max number of type 1 inactive threads.
 9 DB2 GENERIC LUNAME  ==>         Generic VTAM LU name for this DB2
                                     subsystem or data sharing group.
10 IDLE THREAD TIMEOUT ==> 120     0 or seconds until dormant server ACTIVE
                                     thread will be terminated (0-9999)
11 EXTENDED SECURITY   ==> YES     Allow change password and descriptive
                                     security error codes. YES or NO.

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 45. Distributed data facility panel: DSNTIPR

#### Related concepts:

Support for a communications network

### DDF STARTUP OPTION field (DDF subsystem parameter)

The DDF subsystem parameter controls whether DDF is to be loaded at startup and, if DDF is to be loaded, how it is to be started.

Acceptable values:	NO, AUTO, COMMAND
Default:	NO
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC DDF

**NO** Signifies that DDF is not to be loaded at DB2 startup and that it cannot be started with a command. If you specify NO, the stored procedures sample application and DDF sample jobs (DSNTEJ6, DSNTEJ6D, DSNTEJ6P, DSNTEJ6S, DSNTEJ6T, DSNTEJ6Z, DSNTEJ61, DSNTEJ62, DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66) are not edited. Also, the remaining fields on the DSNTIPR panel are ignored. However, the remaining fields require entries, so you can accept the default values.

#### AUTO

Specifies that this facility is to be automatically initialized and started when the DB2 subsystem is started.

#### COMMAND

Specifies that the facility is to be initialized at DB2 startup and is prepared to receive the DSN1 START DDF command.

If AUTO or COMMAND is specified, the DDF address space is started as part of DDF initialization. The remaining fields on the DSNTIPR panel are mandatory. The repository for the field names (LOCATION, LUNAME, and PASSWORD) is the bootstrap data set (BSDS). The BSDS is updated by the change log inventory utility in step DSNTLOG of installation job DSNTIJUZ.

## DB2 LOCATION NAME field

The value of the DB2 LOCATION NAME field specifies the unique name that requesters are to use to connect to this DB2 subsystem. The value of the DB2 LOCATION NAME field must be the same on all members within a DB2 data sharing group.

Acceptable values:	1 to 16 alphanumeric characters
Default:	LOC1
Update:	see "Updating subsystem parameters that cannot be updated by using DSNTIPB" on page 507
DSNZPxxx:	none

The location name must begin with a letter and cannot contain special characters. Acceptable characters are letters A through Z, numbers 0 through 9, and underscores.

You must specify a value for this field, even if you do not use DDF.

## DB2 NETWORK LUNAME field

The value of the DB2 NETWORK LUNAME field specifies the LU name that is to uniquely identify this DB2 subsystem to VTAM. The name is also to be used to uniquely identify logical units of work within DB2 trace records.

Acceptable values:	1 to 8 alphanumeric characters
Default:	LU1
Update:	see Updating subsystem parameters that cannot be updated by using DSNTIPB
DSNZPxxx:	none

The name must begin with a letter and must not contain special characters.

You must specify a value for this field.

## DB2 NETWORK PASSWORD field

The optional DB2 NETWORK PASSWORD field specifies the password that VTAM is to use to recognize this DB2 subsystem.

Acceptable values:	1 to 8 alphanumeric characters
Default:	none
Update:	see Update on Updating subsystem parameters that cannot be updated by using DSNTIPB
DSNZPxxx:	none

This password must also be supplied to VTAM on the VTAM APPL definition statement. The password must begin with a letter and must not contain special characters.

## RLST ACCESS ERROR field (RLFERRD subsystem parameter)

The RLFERRD subsystem parameter specifies the action that DB2 takes for dynamic SQL statements from remote locations if the resource limit facility encounters a condition that prevents it from accessing the resource limit

specification table. This setting also applies if DB2 cannot find an applicable row in the resource limit specification table. This parameter applies to the distributed data facility.

An applicable row is one that applies to the authorization ID, collection ID, or package name, and name of the logical unit of work of the query user. This parameter applies to the distributed data facility.

Acceptable values:	NOLIMIT, NORUN, 1 to 5000000
Default:	NOLIMIT
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC RLFERRD

#### **NOLIMIT**

Allows all dynamic SQL statements to run without limit.


#### **NORUN**

Terminates all dynamic SQL statements immediately with an SQL error code.


#### **1 to 5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

#### **Related concepts:**

 Resource limit facility controls (DB2 Performance)

#### **Related reference:**

 DSNRLSTxx resource limit tables (DB2 Performance)

## **RESYNC INTERVAL field (RESYNC subsystem parameter)**

A *resynchronization period* is the time during which indoubt logical units of work that involve this DB2 subsystem and partner logical units are processed. The RESYNC subsystem parameter specifies the time interval, in minutes, that is to occur between resynchronization periods.

Acceptable values:	1 to 99
Default:	2
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC RESYNC

## **DDF THREADS field (CMTSTAT subsystem parameter)**

The CMTSTAT subsystem parameter controls whether threads are to be made active or inactive after they successfully commit or roll back and hold no cursors. A thread can become inactive only if it holds no cursors, has no temporary tables defined, and executes no statements from the dynamic statement cache.

Acceptable values:	ACTIVE, INACTIVE
Default:	INACTIVE
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC CMTSTAT

#### **ACTIVE**

Threads remain active after they successfully commit or roll back and hold no cursors. This setting provides the best performance but consumes system resources. If your installation must support a large number of connections, specify INACTIVE instead.

## INACTIVE

DB2 supports two different types of inactive concepts:

- An inactive DBAT (previously called a type 1 inactive thread), which has the same characteristics as inactive threads that were available in releases prior to DB2 10. In this case, the thread remains associated with the connections, but the thread's storage utilization is reduced as much as possible. However, this still potentially requires a large number of threads to support a large number of connections.
- An inactive connection (previously called a type 2 inactive thread), which uses less storage than an inactive DBAT. In this case, the connections are disassociated from the thread. The thread is allowed to be pooled and reused for other connections, new or inactive. This provides better resource utilization because there are typically a small number of threads that can be used to service a large number of connections.

Because they use less storage, inactive connections are preferable. However, not all threads can become inactive connections. The following table summarizes the conditions under which you can have an inactive DBAT or an inactive connection. If a thread is to become inactive, DB2 tries to make it an inactive connection. If DB2 cannot make it an inactive connection, it tries to make it an inactive DBAT. If neither attempt is successful, the thread remains active.

*Table 59. Requirements for inactive DBATs and inactive connections*

<b>If the event is...</b>	<b>Inactive connection can be created</b>	<b>Inactive DBAT can be created</b>
A hop to another location with a pending request <sup>1</sup>	No	Yes <sup>2</sup>
A package bound with RELEASE(COMMIT)	Yes	Yes <sup>2</sup>
A package bound with RELEASE(DEALLOCATE)	Yes	No
An outstanding open and held cursor <sup>3</sup> , a held LOB locator, or a package bound with KEEP DYNAMIC(YES)	No	No
A declared temporary table that is active (the table was not explicitly dropped through the DROP TABLE statement or the ON COMMIT DROP TABLE clause on the DECLARE GLOBAL TEMPORARY TABLE statement)	No	No

**Notes:**

1. A pending request occurs when a hop connection is created but no SQL statements are run at that location.
2. An inactive DBAT can only be created if the MAXTYPE1 subsystem parameter is set to a value greater than 0.
3. A cursor can be closed with fast implicit close. For more information, see Fast implicit close (DB2 Performance).

IBM Systems Virtualization Engine Enterprise Workload Manager™ (EWLM) is a robust performance management tool that allows you to monitor and manage

work that runs within your environment. If you use EWLM with DB2, specify INACTIVE for DDF THREADS. Otherwise, DDF ignores all EWLM correlators that are passed to it.

## MAX INACTIVE DBATS field (MAXTYPE1 subsystem parameter)

The MAXTYPE1 subsystem parameter determines the number of inactive DBATs that DB2 is to allow.

Acceptable values:	0 to the value of the MAX REMOTE CONNECTED field
Default:	0
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC MAXTYPE1

This limit is defined because a large number of inactive DBATs might adversely affect system performance. Inactive DBATs were traditionally used for private protocol, while DRDA uses inactive connections. However, inactive DBATS can occur in DRDA when DB2 acts as an intermediate server, receiving a connection from a client, and the thread then hops to another location while a held cursor spans the commit scope.

A value of 0 indicates that inactive DBATs are not allowed. If a thread meets the requirement of an inactive DBATs, and MAX INACTIVE DBATS is 0, the thread remains active.

A value of greater than 0 indicates that inactive DBATs are allowed, but they are limited to the specified number. When a thread meets the requirement of an inactive DBAT, and MAX INACTIVE DBATS is reached, the remote connection is terminated.

If you want to allow inactive DBATs, set this value to the maximum number of concurrent connections that you want to allow to go inactive that access another remote location with three-part names.

A value that is equal to the value in the MAX REMOTE CONNECTED field from panel DSNTIPE allows all remote threads to become type 1 inactive threads.

## DB2 GENERIC LUNAME field

The value of the DB2 GENERIC LUNAME field specifies a generic LU name that is to identify this DB2 subsystem or data sharing group in a network.

Acceptable values:	1 to 8 alphanumeric characters
Default:	none
DSNZPxxx:	none

You can use a generic LU name only if DB2 is running as part of a z/OS Sysplex. Using a generic LU name helps you control the distributed workload among the servers in a data sharing group. Previously, you could associate only one LU name with a LOCATION name. Now, you can associate multiple NETID.LUNAME values with a single LOCATION name. When an application requests access to a particular location, DB2 uses the SYSIBM.LOCATIONS and SYSIBM.LULIST tables to find the available network destinations (LU names) for that location.

**Related tasks:**

Connecting distributed database systems

➔ Configuring data sharing groups for group-generic access (DB2 Data Sharing Planning and Administration)

## **IDLE THREAD TIMEOUT field (IDTHTOIN subsystem parameter)**

The IDTHTOIN subsystem parameter controls the amount of time, in seconds, that an active server thread is to be allowed to remain idle. This amount of time is the timeout value. The thread is canceled after the timeout value expires, and its locks and cursors are released.

Acceptable values:	0 to 9999
Default:	120
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6FAC IDTHTOIN

Inactive and indoubt threads are not subject to timeout. The value that you specify for the DDF THREADS field determines whether a thread can become inactive, and thus not subject to timeout.

Threads are checked every two minutes to see if they have exceeded the timeout value. If the timeout value is less than two minutes, the thread might not be canceled if it has been inactive for more than the timeout value but less than two minutes.

Specifying 0 disables timeout processing. If timeout processing is disabled, idle server threads remain in the system and continue to hold any resources .

## **EXTENDED SECURITY field (EXTSEC subsystem parameter)**

The EXTSEC subsystem parameter specifies how two related security options are to be set. These settings control what happens when a DDF connection has security errors and whether RACF users can change their passwords through the DRDA change password function.

Acceptable values:	YES, NO
Default:	YES
Update:	option 31 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP EXTSEC
Subsystem parameter:	Yes

**YES** Detailed reason codes are returned to a DRDA level 3 client when a DDF connection request fails because of security errors. When using SNA protocols, the requester must have included a product that supports the extended security sense codes. One such product is DB2 Connect.

RACF users can change their passwords by using the DRDA change password function. This support is only for DRDA requesters that have implemented support for changing passwords.

**NO** Generic error codes are returned to the clients and RACF users are prevented from changing their passwords.



**Recommendation:** Specify a value of YES. This setting allows properly enabled DRDA clients to determine the cause of security failures without requiring DB2 operator support. A value of YES also allows RACF users on properly enabled DB2 clients to change their passwords.

**Note:** This is a security-related parameter. When this parameter is set to YES, detailed reason codes are returned to the client when a DDF connection request fails because of security errors that might enable more malicious attacks. If this parameter is set to YES, RACF users can change their passwords by using the DRDA change password function.

## DSNTIP5: Distributed data facility panel 2

The entries on the DSNTIP5 panel are used to configure the distributed data facility (DDF).

```
DSNTIP5      INSTALL DB2 - DISTRIBUTED DATA FACILITY PANEL 2
====>
_

Enter data below:

1 DRDA PORT      ==>          TCP/IP port number for DRDA clients.
                        1-65534 (446 is reserved for DRDA)
2 SECURE PORT    ==>          TCP/IP port number for secure DRDA
                        clients. 1-65534 (448 is reserved
                        for DRDA using SSL)
3 RESYNC PORT    ==>          TCP/IP port for 2-phase commit. 1-65534
4 TCP/IP ALREADY VERIFIED ==> NO Accept requests containing only a
                        userid (no password)? YES, CLIENT,
                        NO, SERVER, or SERVER_ENCRYPT.
5 EXTRA BLOCKS REQ ==> 100    Maximum extra query blocks when DB2 acts
                        as a requester. 0-100
6 EXTRA BLOCKS SRV ==> 100    Maximum extra query blocks when DB2 acts
                        as a server. 0-100
7 TCP/IP KEEPALIVE ==> 120    ENABLE, DISABLE, or 1-65534
8 POOL THREAD TIMEOUT ==> 120 0-9999 seconds

PRESS: ENTER to continue RETURN to exit HELP for more information
```

Figure 46. Distributed data facility panel: DSNTIP5

### DRDA PORT field

The value of the DRDA PORT field determines the TCP/IP port number that is to be used for accepting TCP/IP connection requests from remote DRDA clients.

Acceptable values:	1 to 65534
Default:	none
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	none

If you are enabling data sharing, each member must have the same DRDA port number. You must specify a value for the DRDA PORT field if you plan to use TCP/IP. Leaving this field blank means that you are not using TCP/IP. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

#### Related reference:

[DSNJU003 \(change log inventory\) \(DB2 Utilities\)](#)

## SECURE PORT field

The value of the SECURE PORT field specifies the TCP/IP port number that is to be used for accepting secure TCP/IP connection requests from remote DRDA clients.

Acceptable values:	1 to 65534
Default:	none
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	none

If you are enabling data sharing, each member must have the same secure DRDA port number. You must specify a value if you plan to use TCP/IP with Secure Socket Layer (SSL). Leaving this field blank means that you are not using TCP/IP with SSL. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

### Related reference:

 [DSNJU003 \(change log inventory\) \(DB2 Utilities\)](#)

## RESYNC PORT field

The value of the RESYNC PORT field specifies the TCP/IP port number that is to be used to process requests for two-phase commit resynchronization.

Acceptable values:	1 to 65534
Default:	none
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	none

This value must be different than the value that is specified for DRDA PORT. If you are enabling data sharing, each member must have a unique resynchronization port. Leaving this field blank means that you are not using TCP/IP. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

### Related reference:

 [DSNJU003 \(change log inventory\) \(DB2 Utilities\)](#)

## TCP/IP ALREADY VERIFIED field (TCPALVER subsystem parameter)

The TCPALVER subsystem parameter specifies whether DB2 is to accept TCP/IP connection requests containing only a user ID, or if a stronger form of security is required. If DB2 is to accept only a user ID, no password, RACF PassTicket, or Kerberos ticket is needed.

The TCPALVER subsystem parameter has no effect in the following situations:

- Trusted context users that have been switched
- Connections that use SECPORT, including SSL implementations, such as AT-TLS

Acceptable values:	YES, CLIENT, NO, SERVER, SERVER_ENCRYPT
Default:	NO (SERVER)
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	DSN6FAC TCPALVER
Security parameter:	Yes

**YES** A new connection is accepted with a user ID only.

**CLIENT**

This value can be used as an alternative to YES.

**NO** A user ID and password are required for connection requests, or the connection must be authenticated by a RACF PassTicket or Kerberos ticket. The user ID and password can be encrypted or non-encrypted.

**SERVER**

This value can be used as an alternative to NO.

**SERVER\_ENCRYPT**

A user ID and password are required for connection requests. Kerberos tickets are also accepted. In addition, one of the following must be true:

- The user ID and password is AES (Advanced Encryption Standard)-encrypted.
- The connection is accepted on a port that ensures AT-TLS (Application Transparent - Transport Layer Security) policy protection, such as a DB2 security port (SECPort).


Non-encrypted security credentials or RACF PassTickets are not accepted unless the connection is secured by the TCP/IP network. RACF PassTickets are encoded, which is considered to be a form of security that is weaker than encryption. DES (Data Encryption Standard)-based encryption is also considered insecure.

This value must be the same for all members of a data sharing group. This option applies to all incoming requests that use TCP/IP, regardless of the requesting location.

**Note:** This is a security-related parameter. If the parameter is set to YES or CLIENT, connections are accepted with a user ID only. Security credentials such as a password are not required to authenticate the user ID that is associated with the connection.

**Recommendation:** Setting the parameter to SERVER\_ENCRYPT provides the best security. Connections are accepted only if user credentials are provided to authenticate the user ID, and strong encryption is used to protect the user ID and credentials.

**Related tasks:**

 [Managing inbound TCP/IP-based connection requests \(Managing Security\)](#)

## EXTRA BLOCKS REQ field (EXTRAREQ subsystem parameter)

The EXTRAREQ subsystem parameter limits the number of extra DRDA query blocks that DB2 is to request from a remote DRDA server. This parameter does not limit the size of the SQL query answer set. It simply controls the total amount of data that can be transmitted on a network exchange.

Acceptable values:	0 to 100
Default:	100
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP EXTRAREQ

## EXTRA BLOCKS SRV field (EXTRASRV subsystem parameter)

The EXTRASRV subsystem parameter limits the number of extra DRDA query blocks that DB2 is to return to a DRDA client. This parameter not limit the size of the SQL query answer set. It simply controls the total amount of data that can be transmitted on a network exchange.

Acceptable values:	0 to 100
Default:	100
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP EXTRASRV

## TCP/IP KEEPALIVE field (TCPKPALV subsystem parameter)

The TCPKPALV subsystem parameter determines whether the TCP/IP KeepAlive value in the TCP/IP configuration is to be overridden with a different value. This option can be used in cases where the TCP/IP KeepAlive value in the TCP/IP configuration is not appropriate for the DB2 subsystem.

Acceptable values:	ENABLE, DISABLE, or 1 to 65534
Default:	120
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	DSN6FAC TCPKPALV

### ENABLE

The TCP/IP KeepAlive configuration value is not overridden.

### DISABLE


KeepAlive probing is disabled for this subsystem.

### 1 to 65534

The TCP/IP KeepAlive configuration value is overridden with the value of the TCP/IP KEEPALIVE field. This value is specified in seconds. Consider setting this value close to the IDLE THREAD TIMEOUT value on installation panel DSNTIPR or the RESOURCE TIMEOUT value on installation panel DSNTIPI.

Avoid using very small values. KeepAlive detection is accomplished by probing the network based on the time that is entered in the KeepAlive parameter. A small KeepAlive value can cause excessive network traffic and system resource consumption. Maintain a proper balance that allows network failures to be detected on a timely basis without a severe impact on system and network performance.

### Related tasks:

 [Timing out idle active threads \(DB2 Performance\)](#)

## POOL THREAD TIMEOUT field (POOLINAC subsystem parameter)

The POOLINAC subsystem parameter specifies the approximate time, in seconds, that a database access thread (DBAT) can remain idle in the pool before it is terminated.

Acceptable values:	0 to 9999
Default:	120
Update:	option 32 on panel DSNTIPB
DSNZPxxx:	DSN6FAC POOLINAC

A database access thread in the pool counts as an active thread against MAX REMOTE ACTIVE and can hold locks, but does not have any cursors.

Threads are checked every two minutes to see if they have exceeded the timeout value. If the timeout value is less than two minutes, the thread might not be canceled if it has been inactive for more than the timeout value but less than two minutes.

Specifying 0 causes a DBAT to terminate rather than go into the pool if the pool has a sufficient number of threads to process the number of inactive DBATs (type 2 inactive threads) that currently exist.

## DSNTIPX: Routine parameters panel

The entries on this panel are used to start the stored procedures address space so that it can run stored procedures or user-defined functions.

```
DSNTIPX          INSTALL DB2 - ROUTINE PARAMETERS
===> _
Enter data below:

 1 WLM PROC NAME  ===> DSN1WLM      WLM-established stored procedure JCL PROC
 2 NUMBER OF TCBS ===> 8           Number of concurrent TCBS (1-100)
 3 MAX ABEND COUNT ===> 0          Allowable ABENDs for a routine (0-255)
 4 TIMEOUT VALUE  ===> 180         Seconds to wait before SQL CALL or
                                     function invocation fails (5-1800,NOLIMIT)
 5 WLM ENVIRONMENT ===>           Default WLM environment name
 6 MAX OPEN CURSORS ===> 500       Maximum open cursors per thread
 7 MAX STORED PROCS ===> 2000      Maximum active stored procs per thread
 8 MAXIMUM LE TOKENS ===> 20      Maximum tokens at any time. 0-50
 9 BIF COMPATIBILITY ===> CURRENT  Compatibility level for DB2 built-in
                                     functions (V9, V9_DECIMAL_VARCHAR, V9_TRIM, or
                                     CURRENT)
10 ADMIN SCHEDULER ===> DSNADMT    Administrative scheduler task proc name

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 47. Routine parameters panel: DSNTIPX

### Related concepts:

Migration step 25: Configure DB2 for running stored procedures and user-defined functions (optional)

WLM management of stored procedures

## WLM PROC NAME field

The value of the WLM PROC NAME field specifies a name for the stored procedures JCL procedure that is to be generated during installation. This JCL procedure is generated for the default WLM environment that is specified in the WLM ENVIRONMENT field.

Acceptable values: 1 to 8 alphanumeric characters  
Default: *ssnm*WLM  
DSNZPxxx: none

This procedure is used for a WLM-established stored procedures address space.

If this field has a blank, the JCL procedure is still generated. In this case, the JCL procedure will be named by appending the string WLM to the DB2 subsystem name (specified on panel DSNTIPM in the field SUBSYSTEM NAME).


## NUMBER OF TCBS field

The NUMBER OF TCBS field determines the number of SQL CALL statements and invocations of user-defined functions that can be processed concurrently in the address space of the default WLM environment. The default WLM environment is specified in the WLM ENVIRONMENT field.

Acceptable values:	1 to 100
Default:	8
DSNZPxxx:	none

The larger the value, the more stored procedures and user-defined functions you can run concurrently in one address space. This value is dependent on the z/OS UNIX System Services MAXPROCUSER value. If this value is set above the z/OS UNIX System Services MAXPROCUSER value, you may exceed the maximum number of processes for the user.

### Related tasks:

 Maximizing the number of procedures or functions that run in an address space (DB2 Performance)

### Related reference:

WLM ENVIRONMENT field (WLMENV subsystem parameter)

## MAX ABEND COUNT field (STORMXAB subsystem parameter)

The STORMXAB subsystem parameter specifies the number of times a stored procedure or an invocation of a user-defined function is to be allowed to terminate abnormally. If this threshold is reached, SQL CALL statements for the stored procedure or user-defined function are rejected.

Acceptable values:	0 to 255
Default:	0
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP STORMXAB

The default of 0 means that the first abend of a stored procedure or user defined function causes SQL CALL statements to that procedure or function to be rejected. For production systems, you should accept the default.

## TIMEOUT VALUE field (STORTIME subsystem parameter)

The STORTIME subsystem parameter specifies the number of seconds before DB2 is to stop waiting for an SQL CALL statement or invocation of a user-defined function. This parameter applies to user-defined functions that are to be assigned to one of the task control blocks (TCBs) in a DB2 stored procedures address space.

Acceptable values:	5 to 1800, NOLIMIT
Default:	180
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP STORTIME

If the time interval expires, the SQL statement fails. The default is a reasonable waiting time for most sites. You might want to choose a higher value if your system has long queues. You might want to choose a lower value if you want to minimize the waiting time for end-user requests. The NOLIMIT value means that DB2 waits indefinitely for the SQL request to complete, while the thread is active.

**Recommendation:** Do not select the NOLIMIT value. If the stored procedure address space is down for some reason or the user-defined function does not complete, your SQL request hangs until the request is satisfied or the thread is canceled.

## **WLM ENVIRONMENT field (WLMENV subsystem parameter)**

The WLMENV subsystem parameter specifies the name of the default WLM\_ENVIRONMENT that is to be used for a user-defined function or stored procedure. This environment is used when a value is not specified for the WLM\_ENVIRONMENT option on the CREATE FUNCTION or CREATE PROCEDURE statements.

Acceptable values:	Any valid name from 1 to 32 alphanumeric characters, including underscores
Default:	blank
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SYSP WLMENV

Changing this value does not change existing routines because the value is stored in the catalog when the function or procedure is created.

## **MAX OPEN CURSORS field (MAX\_NUM\_CUR subsystem parameter)**

The MAX\_NUM\_CUR subsystem parameter specifies the maximum number of cursors, including allocated cursors, that can be open at a given DB2 site for each thread.

Acceptable values:	0 to 99999
Default:	500
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MAX_NUM_CUR

DB2 keeps a count of currently open cursors. If an application attempts to open a thread after the maximum is reached, the statement will fail.

## **MAX STORED PROCS field (MAX\_ST\_PROC subsystem parameter)**

The MAX\_ST\_PROC subsystem parameter determines the maximum number of stored procedures that are to be allowed for each thread.

Acceptable values:	0 to 99999
Default:	2000
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MAX_ST_PROC

If an application attempts to call a stored procedure after the maximum is reached, the statement will fail.

## MAXIMUM LE TOKENS field (LEMAX subsystem parameter)

The LEMAX subsystem parameter specifies the maximum number of Language Environment tokens that are to be active at any time.

Acceptable values:	0 to 50
Default:	20
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM LEMAX

If the value is 0, no tokens are available. A token is used each time one of the following functions is used:

- Trigonometry functions (SIN, SINH, ASIN, COS, COSH, ACOS, TAN, TANH, ATANH, ATAN, and ATAN2)
- DEGREES
- RADIANS
- RAND
- EXP
- POWER<sup>®</sup>
- Log functions (LOG, and LOG10)
- UPPER
- LOWER
- TRANSLATE
- ROUND\_TIMESTAMP
- TRUNC\_TIMESTAMP
- LAST\_DAY
- NEXT\_DAY
- ADD\_MONTHS
- Decimal float functions

### Related reference:

 [Scalar functions \(DB2 SQL\)](#)

## BIF COMPATIBILITY field (BIF\_COMPATIBILITY subsystem parameter)

The BIF\_COMPATIBILITY subsystem parameter specifies whether built-in functions and specifications are to return results in the newer format or revert to the pre-DB2 10 format.

**Recommendation:** Avoid making online changes to the BIF\_COMPATIBILITY setting, even though they are permitted, because these changes do not affect SQL statements in the dynamic SQL statement cache.

Acceptable values:	V9_DECIMAL_VARCHAR, V9_TRIM, or CURRENT
Default:	for installation: CURRENT; for migration: V9_DECIMAL_VARCHAR
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM.BIF_COMPATIBILITY



In DB2 10, when the input data is in decimal format, the CHAR, VARCHAR, CAST(*decimal-expression* AS CHAR), and CAST(*decimal-expression* AS VARCHAR) functions no longer return values with any of the following attributes:

- Leading zeros.
- The trailing decimal point character.
- Leading blanks for positive decimal values. This change applies to the CHAR built-in function only.

In DB2 10, invalid EBCDIC mixed data strings that are provided as arguments to LTRIM, RTRIM or STRIP cause the function to issue SQLCODE -171.

When the *string-expression* is an EBCDIC mixed data string, a shift-out control character (X'0E') followed immediately by a shift-in control character (X'0F') can be trimmed along with instances of the trim-character.

If you are migrating from Version 8 or DB2 9, applications that use these functions or cast specifications can produce unexpected output. You might need to modify some of your applications to handle this change. While you prepare for this change, you can use the following options of the BIF\_COMPATIBILITY subsystem parameter to temporarily revert to the pre-DB2 10 behavior. Before you use these options, apply the PTFs for APARs PM29124 and PM66095.

If the BIF\_COMPATIBILITY subsystem parameter is set to a value other than CURRENT, DB2 continues to allow some unsupported timestamp strings for applications. Furthermore, as in previous DB2 releases, SQLCODE -180 is not issued for these unsupported timestamp strings. Apply the PTF for APAR PM48741 to identify applications that use the unsupported timestamp strings. Because these strings are not supported by DB2, you must modify the application SQL to use a supported format for a timestamp string. See String representations of datetime values (DB2 SQL) for supported formats.

#### **V9\_DECIMAL\_VARCHAR**

For decimal input, the CHAR and VARCHAR functions and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the DB2 9 format. When you run the installation CLIST in MIGRATE mode with a DSNTIDXA or DSNTIDXB input member, V9\_DECIMAL\_VARCHAR is the default setting for this parameter.

#### **V9\_TRIM**

For decimal input, the CHAR, VARCHAR, CAST( ... AS CHAR) and CAST( ... as VARCHAR) built-in functions behave as they do when BIF\_COMPATIBILITY is set to V9\_DECIMAL\_VARCHAR. In addition, the LTRIM, RTRIM and STRIP built-in functions behave like DB2 9 with respect to tolerating invalid EBCDIC mixed data strings and treatment of EBCDIC control characters X'0E0F'.

#### **CURRENT**

For decimal input, the CHAR and VARCHAR functions and the CAST(*decimal-expression* AS CHAR) and CAST(*decimal-expression* AS VARCHAR) specifications return data in the DB2 10 format. When you run the installation CLIST in INSTALL mode, CURRENT is the default setting for this parameter.

**Recommendation:** If you need the result of the CHAR and VARCHAR functions and CAST specification to be in Version 9 format when the input data is decimal

data, specify value V9\_DECIMAL\_VARCHAR for the BIF\_COMPATIBILITY subsystem parameter. Value V9 is supported only for compatibility with previous releases.

The following examples show the effect of the BIF\_COMPATIBILITY subsystem parameter on the output of these built-in functions and cast specifications.

Table 60. Example output for CHAR based on BIF\_COMPATIBILITY settings

BIF_COMPATIBILITY setting	OUTPUT for CHAR(000.1)	OUTPUT for CHAR(1000.)	OUTPUT for CHAR(1.1)
V9_DECIMAL_VARCHAR	' 000.1'	' 1000.'	' 1.1'
CURRENT	' .1 '	'1000 '	'1.1 '



Table 61. Example output for VARCHAR and CAST(decimal-expression AS VARCHAR) based on BIF\_COMPATIBILITY settings



BIF_COMPATIBILITY setting	Output for VARCHAR(000.1) or CAST(000.1 AS VARCHAR(3))	Output for VARCHAR(1000.) or CAST(1000. AS VARCHAR(5))	Output for VARCHAR(1.1) or CAST(1.1 AS VARCHAR(3))
V9_DECIMAL_VARCHAR	'0.1'	'1000.'	'1.1'
CURRENT	' .1'	'1000'	'1.1'

Table 62. Example output for CAST(decimal-expression AS CHAR) based on BIF\_COMPATIBILITY settings

BIF_COMPATIBILITY setting	Output for CAST(000.1 AS CHAR(6))	Output for CAST(1000. AS CHAR(6))	Output for CAST(1.1 AS CHAR(4))
V9_DECIMAL_VARCHAR	'0.1 '	'1000. '	'1.1 '
CURRENT	' .1 '	'1000 '	'1.1 '

**Related concepts:**

 Application and SQL release incompatibilities for migration from Version 8 

 Application and SQL release incompatibilities for migration from Version 9.1 

**Related reference:**

 CHAR (DB2 SQL)

 VARCHAR (DB2 SQL)

## ADMIN SCHEDULER field (ADMTPROC subsystem parameter)

The ADMIN SCHEDULER field identifies a name for the JCL procedure that is used to start the DB2 administrative task scheduler that is associated with this DB2 subsystem.

Acceptable values:	1 to 8 alphanumeric characters
Default:	ssnADMT
Update:	option 33 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM ADMTPROC

### 1 to 8 alphanumeric characters

When DB2 starts, it starts the administrative task scheduler that is specified in the ADMIN SCHEDULER field, if that scheduler is not yet started. Also, every time DB2 starts or stops, it posts an event to the administrative task scheduler so that the administrative task scheduler can execute tasks that depend on those events.

### blank

To disable the administrative task scheduler, enter blanks in the ADMIN SCHEDULER field. If you replace the default value with blanks, DB2 will not start the administrative task scheduler until you update the subsystem parameter.

This parameter cannot be updated online.

---

## DSNTIPR1: Parameters for DB2-supplied routines panel

The DSNTIPR1 panel enables you to establish default WLM environment names for DB2-supplied routines and to access panels for advanced configuration of these routines.

```
DSNTIPR1    INSTALL DB2 PARAMETERS FOR DB2-SUPPLIED ROUTINES
====>
Enter the default WLM environment names for DB2-supplied routines:
 1 FOR MOST DB2 ROUTINES      >>>> DSNWLM_GENERAL
 2 FOR ROUTINES IDENTIFIED
   TO PROGRAM CONTROL         >>>> DSNWLM_PGM_CONTROL
 3 FOR SERIALIZED ROUTINES    >>>> DSNWLM_NUMTCB1

 4 FOR DB2 UTILITIES ROUTINES >>>> DSNWLM_UTILS
 5 FOR DB2 XML PROCESSING ROUTINES>>>> DSNWLM_XML
 6 FOR DB2 JAVA ROUTINES      >>>> DSNWLM_JAVA
 7 FOR DB2 REXX ROUTINES      >>>> DSNWLM_REXX
 8 FOR UNIFIED DEBUGGER ROUTINES >>>> DSNWLM_DEBUGGER

 9 FOR THE DB2 CICS ROUTINE    >>>> DSNWLM_DSNACICS
10 FOR DB2 MQSERIES ROUTINES  >>>> DSNWLM_MQSERIES
11 FOR DB2 WEB SERVICES ROUTINES >>>> DSNWLM_WEBSERVICES

Specify whether to enter advanced configuration of DB2-supplied routines:
12 ADVANCED CONFIGURATION OPTIONS >>>> NO   Enter advanced options (NO or YES)

PRESS: ENTER to continue   RETURN to exit   HELP for more information
```

Figure 48. Parameters for DB2-supplied routines panel: DSNTIPR1

Values on the DSNTIPR1 panel are used to customize configuration statements in installation job DSNTIJRT, which creates and grants access to the DB2-supplied routines and any related databases, table spaces, tables, indexes, and created global temporary tables. The values are also used to customize installation job DSNTIJRW, which defines core WLM environments for DB2-supplied stored procedures and user-defined functions. If you change an environment name on the DSNTIPR1 panel, the change is applied in the advanced configuration panel settings to all routines that use the original name.

If you change a WLM environment name on this panel, the WLM ENV NAME field of each corresponding routine in the advanced configuration options panels is also changed. For example, if you change the setting of the FOR DB2 XML

PROCESSING ROUTINES field from DSNWLM\_XML to DSNWLM\_MY\_XML, then the DSNTIPRJ panel will contain DSNWLM\_MY\_XML in the WLM ENV NAME fields for all routines.

Changes on the DSNTIPR1 panel do not affect a corresponding routine's WLM ENV NAME field if the WLM ENV NAME value has been previously modified on the advanced configuration options panel. For example, if you change the WLM ENV NAME setting for XSR\_ADDSCHEMADOC from DSNWLM\_XML to MY\_WLM\_ENVIRONMENT on the DSNTIPRJ panel, it will remain MY\_WLM\_ENVIRONMENT even if you subsequently change the setting of the FOR DB2 XML PROCESSING ROUTINES field on the DSNTIPR1 panel from DSNWLM\_XML to DSNWLM\_MY\_XML.

## FOR MOST DB2 ROUTINES field

The value of the FOR MOST DB2 ROUTINES field identifies the WLM environment that is to be used for running most DB2-supplied routines.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

## FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL field

The FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL field identifies the WLM environment that is to be used for running DB2-supplied routines that require program control. These routines can be registered to RACF or an equivalent product.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_PGM_CONTROL
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

### Related information:

 [Defining modules to program control \(UNIX System Services Planning\)](#)

## FOR SERIALIZED ROUTINES field

The value of the FOR SERIALIZED ROUTINES field identifies the WLM environment that is to be used for DB2-supplied routines that need to run serially. A routine that must run serially cannot share a task control block with another routine.

These routines require an environment that has a NUMTCB setting of 1. These routines do not include LANGUAGE REXX routines or SYSPROC.DSNUTILS and SYSPROC.DSNUTILU.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_NUMTCB1
DSNZPxxx:	none

## FOR DB2 UTILITIES ROUTINES field

The value of the FOR DB2 UTILITIES ROUTINES field identifies the name of the WLM environment that is to be used for running the DB2-supplied routines for utilities. This WLM environment should be used only by the SYSPROC.DSNUTILS and SYSPROC.DSNUTILU stored procedures.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_UTILIS
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

## FOR DB2 XML PROCESSING ROUTINES field

The value of the FOR DB2 XML PROCESSING ROUTINES field identifies the WLM environment that is to be used for running most DB2-supplied XML processing routines. This applies to the XSR\_ADDSCHEMADOC, XSR\_REGISTER, and XSR\_REMOVE routines.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_XML
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

## FOR MOST DB2 JAVA ROUTINES field

The value of the FOR MOST DB2 JAVA ROUTINES field identifies the WLM environment that is to be used for running most DB2-supplied Java routines.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_JAVA
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

## FOR DB2 REXX ROUTINES field

The value of the FOR DB2 REXX ROUTINES field identifies the name of the WLM environment that is to be used for DB2-supplied REXX routines.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_REXX
DSNZPxxx:	none

### Related reference:

Installation information for procedures and functions that are supplied with DB2

## FOR UNIFIED DEBUGGER ROUTINES field

The FOR UNIFIED DEBUGGER ROUTINES field identifies the WLM environment that is to be used for DB2-supplied routines that are for the unified debugger tool.

Acceptable values:	a valid WLM environment name
--------------------	------------------------------

Default: DSNWLM\_DEBUGGER  
DSNZPxxx: none

**Related reference:**

Installation information for procedures and functions that are supplied with DB2

## FOR THE DB2 CICS ROUTINE field

The value of the FOR THE DB2 CICS ROUTINE field identifies the WLM environment that is to be used for the DB2 CICS transaction processor routine SYSPROC.DSNACICS.

Acceptable values: a valid WLM environment name  
Default: DSNWLM\_CICS  
DSNZPxxx: none

**Related reference:**

Installation information for procedures and functions that are supplied with DB2

## FOR DB2 MQSERIES ROUTINES field

The value of the FOR DB2 MQSERIES ROUTINES field specifies the name of the WLM environment that is to be used for DB2 MQSeries functions.

Acceptable values: a valid WLM environment name  
Default: DSNWLM\_MQSERIES  
DSNZPxxx: none

**Related reference:**

Installation information for procedures and functions that are supplied with DB2

## FOR DB2 WEB SERVICES ROUTINES field

The value of the FOR DB2 WEB SERVICES ROUTINES field identifies the WLM environment that is to be used for DB2 web services functions.

Acceptable values: a valid WLM environment name  
Default: DSNWLM\_WEBSERVICES  
DSNZPxxx: none

**Related reference:**

Installation information for procedures and functions that are supplied with DB2

## ADVANCED CONFIGURATION OPTIONS field

The value of the ADVANCED CONFIGURATION OPTIONS field determines whether optional panels that are for advanced configuration of DB2-supplied stored procedures and functions are to be displayed.

Acceptable values: NO, YES  
Default: NO  
DSNZPxxx: none

**NO** Skips the panels for advanced configuration of stored procedures and displays the DSNTIPZ panel.

YES

Displays panels for advanced configuration of DB2-supplied stored procedures, starting with panel DSNTIPRA.

## DB2 routine selection panel: DSNTIPRA

The DSNTIPRA panel provides access to additional panels for advanced configuration options of DB2-supplied routines. This panel is displayed if you specify YES in the ADVANCED CONFIGURATION OPTIONS field on the DSNTIPR1 panel.

If you specify NO in the ADVANCED CONFIGURATION OPTIONS field, the DSNTIPZ panel is displayed instead.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION -----+
DSNTIPRA      DB2 Routine Selection Panel
Option ==>

 1 Trace formatting routines
 2 Utility invocation routines
 3 Runtime statistics processing routines
 4 DB2 security routines
 5 Java and SQL procedure processing routines
 6 Unified debugger for Java and SQL routines
 7 XML schema processing routines
 8 IBM Text Search routines
 9 Database metadata routines
10 DB2 administration routines
11 DB2 query optimization routines
12 CICS and IMS transaction invocation routines
13 MQSeries routines
14 Web services/SOAP routines
15 JSON routines

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+
+-----+
+-----+
```

Figure 49. DB2 routine selection panel: DSNTIPRA

### To view and modify the advanced options for a routine type:

In the Option field, enter the number of the routine type, and then press the Enter key.

### To exit advanced configuration and display the next standard installation panel, DSNTIPZ:

Leave the Option field blank and press the Enter key.

### To return to the DSNTIPRA panel:

Press the Return key.

## Trace formatting routines panel: DSNTIPRB

The DSNTIPRB panel allows you to modify configuration options for trace formatting routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```
----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----
DSNTIPRB          Trace Formatting routines
====>
DSNWSPM
WLM ENV NAME     ==> DSNWLM_NUMTCB1
GRANT EXECUTE    ==> PUBLIC
PACKAGE OWNER    ==>
DSNWZP
WLM ENV NAME     ==> DSNWLM_NUMTCB1
GRANT EXECUTE    ==> PUBLIC
PACKAGE OWNER    ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
```

Figure 50. Trace formatting routines panel: DSNTIPRB

### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_NUMTCB1
DSNZPxxx:	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values:	blank, or a valid authorization ID
Default:	blank



DSNZPxxx: none

## Utility invocation routines panel: DSNTIPRC

The DSNTIPRC panel allows you to modify configuration options for utility invocation routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRC          Utility invocation routines
====>
DSNUTILS
WLM ENV NAME  ==> DSNWLM_UTILS
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNUTILU
WLM ENV NAME  ==> DSNWLM_UTILS
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNUTILV
WLM ENV NAME  ==> DSNWLM_UTILS
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 51. Utility invocation routines panel: DSNTIPRC

### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values: a valid WLM environment name  
Default: DSNWLM\_UTILS  
DSNZPxxx: none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values: at least one valid authorization ID  
Default: PUBLIC  
DSNZPxxx: none

### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for

most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
 Default: blank  
 DSNZPxxx: none

### Run time statistics processing routines panel: DSNTIPRD

The DSNTIPRD panel allows you to modify configuration options for run time statistics processing routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRD   Runtime statistics processing routines
====>

DSNACCOR
WLM ENV NAME  ===> DSNWLM_GENERAL
GRANT EXECUTE ===> PUBLIC
PACKAGE OWNER ===>
STATS_MONITOR
WLM ENV NAME  ===> DSNWLM_GENERAL
GRANT EXECUTE ===> PUBLIC
PACKAGE OWNER ===>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+
  
```

Figure 52. Run time statistics processing routines panel: DSNTIPRD

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values: a valid WLM environment name  
 Default: DSNWLM\_GENERAL  
 DSNZPxxx: none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values: at least one valid authorization ID  
 Default: PUBLIC  
 DSNZPxxx: none

## PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
Default: blank  
DSNZPxxx: none

## DB2 security routines panel: DSNTIPRE

The DSNTIPRE panel allows you to modify configuration options for the SYSIBM.USERNAMES encryption routine.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRE                      DB2 security routines          |
| ==>                            |
|                                  |
| DSNLEUSR                        |
| WLM ENV NAME ==> DSNWLM_NUMTCB1 |
| GRANT EXECUTE ==> PUBLIC       |
| PACKAGE OWNER ==>              |
|                                  |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit    |
+-----+
```

Figure 53. DB2 security routines panel: DSNTIPRE

## WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values: a valid WLM environment name  
Default: DSNWLM\_NUMTCB1  
DSNZPxxx: none

## GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values: at least one valid authorization ID  
Default: PUBLIC  
DSNZPxxx: none

## PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values:	blank, or a valid authorization ID
Default:	blank
DSNZPxxx:	none

## Java and SQL procedure processing routines panel: DSNTIPRF

The DSNTIPRF panel allows you to modify configuration options for SQL procedure processing routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRF  Java and SQL procedure processing routines
====>

ALTER_JAVA_PATH
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DB2_INSTALL_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DB2_REMOVE_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DB2_REPLACE_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DB2_UPDATEJARINFO
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
INSTALL_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
REMOVE_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
REPLACE_JAR
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNTBIND
WLM ENV NAME  ==> DSNWLM_REXX
GRANT EXECUTE ==> PUBLIC
DSNTPSMP
WLM ENV NAME  ==> DSNWLM_REXX
GRANT EXECUTE ==> PUBLIC
WLM_REFRESH
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 54. Java and SQL procedure processing routines panel: DSNTIPRF

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL for most routines, DSNWLM_REXX for DSNTBIND and DSNTPSMP
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC

DSNZPxxx: none

### **PACKAGE OWNER**

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
Default: blank  
DSNZPxxx: none

### **Unified debugger for Java and SQL routines panel: DSNTIPRH**

The DSNTIPRH panel allows you to modify configuration options for unified debugger for SQL and Java routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRH Unified debugger for Java and SQL routines
====>
CREATE_SESSION
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DEBUGGERLEVEL
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DESTROY_SESSION
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
GET_REPORT
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
LIST_SESSION
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
PUT_COMMAND
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
QUERY_SESSION
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_ENDSESSIONMANAGER
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_INITIALIZECLIENT
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_LOOKUPSESSIONMANAGER
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_PINGSESSIONMANAGER
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_RECVCLIENTREPORTS
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_RUNSESSIONMANAGER
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
DBG_SENDCLIENTCOMMANDS
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_SENDCLIENTREQUESTS
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
DBG_TERMINATECLIENT
WLM ENV NAME ==> DSNWLM_DEBUGGER
GRANT EXECUTE ==> PUBLIC
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 55. Unified debugger for Java and SQL routines panel: DSNTIPRH

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_DEBUGGER for most routines, DSNWLM_GENERAL for DBG_RUNSESSIONMANAGER
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values:	blank, or a valid authorization ID
Default:	blank
DSNZPxxx:	none

### XML processing routines panel: DSNTIPRI

The DSNTIPRI panel allows you to modify configuration options for XSL transform and XML schema processing routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRI          XML processing routines
====>

XSLTRANSFORM
WLM ENV NAME  ==> DSNWLM_JAVA
GRANT EXECUTE ==> PUBLIC
XSR_ADDSCHEMADOC
WLM ENV NAME  ==> DSNWLM_XML
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
XSR_COMPLETE
WLM ENV NAME  ==> DSNWLM_JAVA
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
XSR_REGISTER
WLM ENV NAME  ==> DSNWLM_XML
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
XSR_REMOVE
WLM ENV NAME  ==> DSNWLM_XML
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 56. XML processing routines panel: DSNTIPRI



### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_XML for most routines, DSNWLM_JAVA for XSR_COMPLETE and XSLTRANSFORM
DSNZPxxx:	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values:	blank, or a valid authorization ID
Default:	blank
DSNZPxxx:	none

### IBM Text Search routines panel: DSNTIPRJ

The DSNTIPRJ panel allows you to modify configuration options for Text Search routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRJ          IBM Text Search routines
====>
SYSTS_ALTER
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_CREATE
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_DROP
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_ENCRYPT
  WLM ENV NAME  ==> DSNWLM_JAVA
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_RESTORE
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_START
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_STOP
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_TAKEOVER
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SYSTS_UPDATE
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 57. IBM Text Search routines panel: DSNTIPRJ

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL (DSNWLM_JAVA for SYSTS_ENCRYPT)
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

#### PACKAGE OWNER

| Specify the ID that should own the package when it is bound (the value for  
| the OWNER parameter of the BIND PACKAGE command). The default for  
| most routines is blank, meaning that no OWNER parameter is included in the  
| BIND PACKAGE command. This field does not display for routines that do  
| not have package.

| Acceptable values: blank, or a valid authorization ID  
| Default: blank  
| DSNZPxxx: none  
|

### | **Database metadata routines panel: DSNTIPRK**

| The DSNTIPRK panel allows you to modify configuration options for database  
| metadata routines.

| Because space on this panel is limited, all fields might not be displayed at one  
| time. The number of fields that are displayed depends on the maximum number of  
| rows your ISPF display device can display at one time, whether you use split  
| screen mode, and where you choose to split the screen. This panel is defined as a  
| scrollable panel, which enables you to view all the fields if they are not displayed  
| at one time. The panel can be scrolled when the label "More" displays near the  
| upper right corner of the panel. A plus symbol (+) following "More" indicates that  
| the panel can be scrolled down, and a minus symbol (-) indicates that the panel  
| can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll  
| through the fields. (Alternatively, you can assign your PF keys to be the DOWN  
| and UP commands.)  
|

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRK          Database metadata routines
====>

SQLCAMESSAGE
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
SQLCOLPRIVILEGES
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLCOLUMNS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLFOREIGNKEYS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLFUNCTIONCOLS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLFUNCTIONS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLGETTYPEINFO
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLPRIMARYKEYS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLPROCEDURECOLS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLPROCEDURES
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLPSEUDOCOLUMNS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLSPECIALCOLUMNS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLSTATISTICS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLTABLEPRIVILEGES
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLTABLES
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
SQLUDTS
  WLM ENV NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 58. Database metadata routines panel: DSNTIPRK

### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL
DSNZPxxx:	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values:	blank, or a valid authorization ID
Default:	blank
DSNZPxxx:	none

### DB2 administration routines panel: DSNTIPRL

The DSNTIPRL panel allows you to modify configuration options for routines that are to be used for administration.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRL          DB2 administration routines
====>
ADMIN_COMMAND_DB2
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_COMMAND_DSN
  WLM_ENV_NAME  ==> DSNWLM_REXX
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_COMMAND_MVS
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_COMMAND_UNIX
  WLM_ENV_NAME  ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_BROWSE
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_DELETE
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_LIST
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_RENAME
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_SEARCH
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_DS_WRITE
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>

ADMIN_INFO_HOST
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_INFO_SMS
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_INFO_SQL
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_INFO_SSID
  WLM_ENV_NAME  ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>

```

Figure 59. DB2 administration routines panel: DSNTIPRL (part 1 of 3)

```

ADMIN_INFO_SYSLOG
  WLM_ENV_NAME ==> DSNWLM_REXX
  GRANT EXECUTE ==> PUBLIC
ADMIN_INFO_SYSPARM
  WLM_ENV_NAME ==> DSNWLM_NUMTCB1
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_JOB_CANCEL
  WLM_ENV_NAME ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_JOB_FETCH
  WLM_ENV_NAME ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_JOB_QUERY
  WLM_ENV_NAME ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_JOB_SUBMIT
  WLM_ENV_NAME ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_ADD
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_CANCEL
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_LIST
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_OUTPUT
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_REMOVE
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_STATUS
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_TASK_UPDATE
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_UPDATE_SYSPARM
  WLM_ENV_NAME ==> DSNWLM_REXX
  GRANT EXECUTE ==> PUBLIC
ADMIN_UTL_EXECUTE
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_UTL_MODIFY
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_UTL_MONITOR
  WLM_ENV_NAME ==> DSNWLM_PGM_CONTROL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>
ADMIN_UTL_SCHEDULE
  WLM_ENV_NAME ==> DSNWLM_GENERAL
  GRANT EXECUTE ==> PUBLIC
  PACKAGE OWNER ==>

```

Figure 60. DB2 administration routines panel: DSNTIPRL (part 2 of 3)

```

ADMIN_UTL_SORT
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSN_WLM_APPLENV
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNACCOX
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_CONFIG
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_MESSAGE
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_SYSTEM_INFO
WLM_ENV_NAME ==> DSNWLM_NUMTCB1
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
SET_MAINT_MODE_RECORD_NO_TEMPORALHISTORY
GRANT EXECUTE ==> user-id
SET_PLAN_HINT
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
WLM_SET_CLIENT_INFO
WLM_ENV_NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 61. DB2 administration routines panel: DSNTIPRL (part 3 of 3)

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	see the panel illustration for the default environment name of each routine
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

#### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for



most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
 Default: blank  
 DSNZPxxx: none

### DB2 optimization routines panel: DSNTIPRM

The DSNTIPRM panel allows you to modify configuration options for routines that are to be used for optimization.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

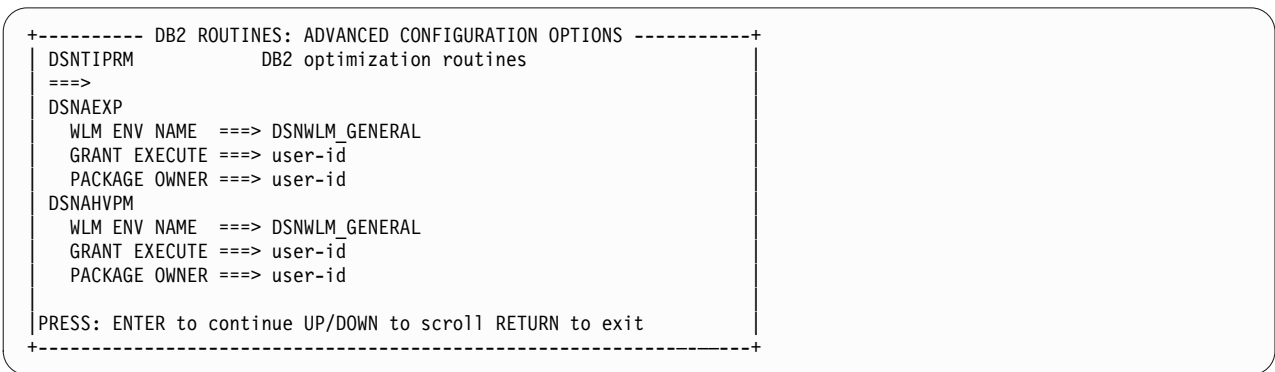


Figure 62. DB2 query optimization routines panel: DSNTIPRM

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values: a valid WLM environment name  
 Default: DSNWLM\_GENERAL  
 DSNZPxxx: none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

The setting *user-id* is the TSO user ID used to run the installation CLIST.

Acceptable values: at least one valid authorization ID  
 Default: user-id  
 DSNZPxxx: none

## PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

The setting *user-id* is the TSO user ID used to run the installation CLIST.

Acceptable values:	blank, or a valid authorization ID
Default:	user-id
DSNZPxxx:	none

## CICS and IMS transaction invocation routines panel: DSNTIPRN

The DSNTIPRN panel allows you to modify configuration options for CICS and IMS transaction invocation routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRN CICS and IMS transaction invocation routines
====>
DSNACICS
WLM ENV NAME  ==> DSNWLM_DSNACICS
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNAIMS
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNAIMS2
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
```

Figure 63. CICS and IMS transaction invocation routines panel: DSNTIPRN

## WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL (DSNWLM_DSNACICS for DSNACICS)
DSNZPxxx:	none

## GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values: at least one valid authorization ID  
Default: PUBLIC  
DSNZPxxx: none

## PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
Default: blank  
DSNZPxxx: none

## MQSeries routines panel: DSNTIPRO

The DSNTIPRO panel allows you to modify configuration options for MQSeries routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRO          MQSeries routines
====>
MQREAD
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQREADALL
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQREADALLCLOB
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQREADCLOB
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQRECEIVE
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQRECEIVEALL
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQRECEIVEALLCLOB
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQRECEIVECLOB
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
MQSEND
  WLM ENV NAME  ===> DSNWLM_MQSERIES
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 64. MQSeries routines panel: DSNTIPRO

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_MQSERIES
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

#### PACKAGE OWNER

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for

most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
 Default: blank  
 DSNZPxxx: none

### Web services/SOAP routines panel: DSNTIPRP

The DSNTIPRP panel allows you to modify configuration options for web services and SOAP routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRP           Web services/SOAP routines
====>

SOAPHTTTPC
WLM ENV NAME  ===> DSNWLM_WEBSERVICES
GRANT EXECUTE ===> PUBLIC
SOAPHTTTPNC
WLM ENV NAME  ===> DSNWLM_WEBSERVICES
GRANT EXECUTE ===> PUBLIC
SOAPHTTTPNV
WLM ENV NAME  ===> DSNWLM_WEBSERVICES
GRANT EXECUTE ===> PUBLIC
SOAPHTTTPV
WLM ENV NAME  ===> DSNWLM_WEBSERVICES
GRANT EXECUTE ===> PUBLIC
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
  
```

Figure 65. Web services/SOAP routines panel: DSNTIPRP

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values: a valid WLM environment name  
 Default: DSNWLM\_WEBSERVICES  
 DSNZPxxx: none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values: at least one valid authorization ID

Default: PUBLIC  
DSNZPxxx: none

### **PACKAGE OWNER**

Specify the ID that should own the package when it is bound (the value for the OWNER parameter of the BIND PACKAGE command). The default for most routines is blank, meaning that no OWNER parameter is included in the BIND PACKAGE command. This field does not display for routines that do not have package.

Acceptable values: blank, or a valid authorization ID  
Default: blank  
DSNZPxxx: none

### **JSON routines panel: DSNTIPRQ**

The DSNTIPRQ panel allows you to modify configuration options for JSON routines.

Because space on this panel is limited, all fields might not be displayed at one time. The number of fields that are displayed depends on the maximum number of rows your ISPF display device can display at one time, whether you use split screen mode, and where you choose to split the screen. This panel is defined as a scrollable panel, which enables you to view all the fields if they are not displayed at one time. The panel can be scrolled when the label "More" displays near the upper right corner of the panel. A plus symbol (+) following "More" indicates that the panel can be scrolled down, and a minus symbol (-) indicates that the panel can be scrolled up. You can use the ISPF scroll commands DOWN and UP to scroll through the fields. (Alternatively, you can assign your PF keys to be the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRQ          JSON routines
====>

JSON_BINARY
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_BINARY2
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_GET_POS_ARR_INDEX
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_LEN
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_TABLE
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_TABLE_BINARY
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_TYPE
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
JSON_UPDATE
WLM ENV NAME  ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
REGSP
GRANT EXECUTE ==> PUBLIC
REG_MATCHES
GRANT EXECUTE ==> PUBLIC

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 66. JSON routines panel: DSNTIPRQ

#### WLM ENV NAME

Specify the WLM environment name for the routine.

Acceptable values:	a valid WLM environment name
Default:	DSNWLM_GENERAL
DSNZPxxx:	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

Acceptable values:	at least one valid authorization ID
Default:	PUBLIC
DSNZPxxx:	none

## DSNTIPZ: Data definition control support panel

The entries on the DSNTIPZ panel allow you to install and tailor data definition control support.

Two SQL tables (application registration and object registration) are identified and created even if data definition control support is not installed. This simplifies future activation of the facility. Specified application identifiers (DB2 plans or collections of packages) can be registered in the application registration table, and,

optionally, their associated DB2 object names can be registered in the object registration table. DB2 consults these two tables prior to accepting a given DDL statement to make sure that a particular application identifier and object name are registered.

```

DSNTIPZ      INSTALL DB2 - DATA DEFINITION CONTROL SUPPORT
====>

Enter data below:

 1 INSTALL DD CONTROL SUPT  ===> NO          YES - activate the support
                               NO - omit DD control support
 2 CONTROL ALL APPLICATIONS ===> NO          YES or NO
 3 REQUIRE FULL NAMES      ===> YES          YES or NO
 4 UNREGISTERED DDL DEFAULT ===> ACCEPT      Action for unregistered DDL:
                                           ACCEPT - allow it
                                           REJECT - prohibit it
                                           APPL - consult ART
 5 ART/ORT ESCAPE CHARACTER ===>            Used in ART/ORT Searches
 6 REGISTRATION OWNER      ===> DSNRGCOL      Qualifier for ART and ORT
 7 REGISTRATION DATABASE   ===> DSNRGFDB      Database name
 8 APPL REGISTRATION TABLE ===> DSN_REGISTER_APPL Table name
 9 OBJT REGISTRATION TABLE ===> DSN_REGISTER_OBJT Table name


Note: ART = Application Registration Table
      ORT = Object Registration Table

PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 67. Data definition control support panel: DSNTIPZ

#### Related information:

 [Managing access through data definition control \(Managing Security\)](#)

### INSTALL DD CONTROL SUPT field (RGFINSTL subsystem parameter)

The RGFINSTL subsystem parameter determines whether data definition control support is to be installed.

Acceptable values:	YES, NO
Default:	NO
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFINSTL

#### YES

Data definition control support is installed.

**NO** Data definition control support is not installed. DDL statements are not validated by this support. The application registration table and object registration table are still created according to values that are entered in fields 5 through 8 on panel DSNTIPZ.

### CONTROL ALL APPLICATIONS field (RGFDEDPL subsystem parameter)

The RGFDEDPL subsystem parameter specifies whether the DB2 subsystem is to be completely controlled by a set of closed applications that are identified in the application registration table.



Acceptable values:	YES, NO
Default:	NO
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFDEDPL

Closed applications require their DB2 objects to be managed solely through the plans or packages of the closed application that is registered in the application registration table.

## **REQUIRE FULL NAMES field (RGFFULLQ subsystem parameter)**

The RGFFULLQ subsystem parameter specifies whether registered objects are to require fully qualified names.

Acceptable values:	YES, NO
Default:	YES
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFFULLQ

## **UNREGISTERED DDL DEFAULT field (RGFDEFLT subsystem parameter)**

The RGFDEFLT subsystem parameter specifies the action that is to be taken for DDL statements that name unregistered objects.

Acceptable values:	ACCEPT, REJECT, APPL
Default:	ACCEPT
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFDEFLT

### **ACCEPT**

DDL statements that name unregistered objects are accepted.

### **REJECT**

DDL statements that name unregistered objects are rejected.

### **APPL**

DDL statements that name unregistered objects are rejected if the current application is not registered.

## **ART/ORT ESCAPE CHARACTER field (RGFESCP subsystem parameter)**

The RGFESCP subsystem parameter specifies the escape character that is to be used in the application registration table (ART) or object registration table (ORT).

Acceptable values:	any non-alphanumeric character
Default:	none
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFESCP

Sets of names in the ART and ORT can be represented by patterns that use the underscore (\_) and percent sign (%) characters in the same way as in an SQL LIKE predicate.

If you enter a character in this field, it can be used in those patterns in the same way as an escape character is used in an SQL LIKE predicate.

**Related tasks:**

 [Installing data definition control support \(Managing Security\)](#)

## **REGISTRATION OWNER field (RGFCOLID subsystem parameter)**

The RGFCOLID subsystem parameter specifies the ID that is to own both the application registration table and the object registration table.

Acceptable values:	1 to 8 characters
Default:	DSNRGCOL
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFCOLID

## **REGISTRATION DATABASE field (RGFDBNAM subsystem parameter)**

The RGFDBNAM subsystem parameter specifies the name of the database that is to contain the registration tables that are used for data definition control support.

Acceptable values:	1 to 8 characters
Default:	DSNRGFDB
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFDBNAM

## **APPL REGISTRATION TABLE field (RGFNMPRT subsystem parameter)**

The RGFNMPRT subsystem parameter specifies the name that is to be used for the application registration table.

Acceptable values:	1 to 17 characters
Default:	DSN_REGISTER_APPL
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFNMPRT

## **OBJT REGISTRATION TABLE field (RGFNMORT subsystem parameter)**

The RGFNMORT subsystem parameter specifies the name that is to be used for the object registration table (ORT).

Acceptable values:	1 to 17 characters
Default:	DSN_REGISTER_OBJT
Update:	option 35 on panel DSNTIPB
DSNZPxxx:	DSN6SPRM RGFNMORT

## DSNTIPY: Job editing panel

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

```
DSNTIPY          INSTALL DB2 - JOB EDITING
===>

Enter data below:

 1  REMOTE LOCATION  ===>          Remote location for COBOL
                                     organization application

Enter job card information for install and sample jobs:

 2  ===>
 3  ===>
 4  ===>
 5  ===>
 6  ===>
 7  ===>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 68. Job editing panel: DSNTIPY

### Related concepts:

System affinity for installation jobs  
Multiple procedure libraries

### Related reference:

- [JCLLIB statement \(MVS JCL Reference\)](#)
- [JES2 Control Statements \(MVS JCL Reference\)](#)
- [JES3 Control Statements \(MVS JCL Reference\)](#)

## REMOTE LOCATION field

The REMOTE LOCATION field specifies the location of another DB2 subsystem. The remote subsystem is used by the COBOL preparation sample job DSNTJ3C, the DDF remote location update sample job DSNTJ6, and the stored procedures sample jobs. The stored procedures sample jobs that require a remote location name are DSNTJ6D, DSNTJ6P, DSNTJ6S, DSNTJ6T, DSNTJ61, and DSNTJ62.

Acceptable values:	1 to 16 characters
Default:	none
Update:	See Updating subsystem parameter and application default values
DSNZPxxx:	none

The location name must begin with a letter and must not contain special characters. A remote location name is accepted only if you have also entered a DB2 location name for the DB2 LOCATION NAME field on installation panel DSNTIPR.

**Related reference:**

DB2 LOCATION NAME field

## Job card information fields

The job card information fields specify the job statements that are to be used in all the installation and sample application jobs.

Acceptable values:	see below
Default:	none
Update:	option 36 on panel DSNTIPB
DSNZPxxx:	none

Specify the job name in one of two ways:

- If the job name is *member*, the job name for each job is the same as its member name.
- If the job name is any value other than *member*, the name is truncated to seven characters, and one character is added to the end of the name to identify the run order for that job.

An example of job card information follows:

```
3====> //MEMBER JOB,  
4====> // MSGLEVEL=(1,1),MSGCLASS=H,REGION=2M,CLASS=A  
5====> // USER=SYSADM,PASSWORD=SYSADM,NOTIFY=SYSADM  
6====>
```

---

## DSNTIPC: CLIST calculations panel 1

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

Space estimates from these messages do not account for cylinder rounding. Base requirements can be 10% - 20% higher than the message indicates, depending on the disk type.

The messages show that most of the needed virtual storage is in extended private storage and storage above the 2 GB bar, including the buffer pool, the EDM pool, and almost all of the code and working storage.

For most fields on this panel, you have a choice between accepting or overriding the calculated value:

During the tailoring session, message DSNT438I is issued to the tailoring terminal. This message, which shows the IRLM LOCK MAXIMUM SPACE and MAX STORAGE FOR LOCKS values, is always issued if you accept the default values.

This message indicates that the IRLM could request a total amount of space that is larger than the available space, causing an abend. The message is based on the following variables:

- The maximum number of data or row locks per user that is specified on installation panel DSNTIPJ (LOCKS PER USER)
- The number of users that is specified on installation panel DSNTIPE for MAX USERS and MAX REMOTE ACTIVE

The CLIST assumes that the private region that is available for IRLM locks is estimated as 60,000 KB.

```

DSNTIPC          INSTALL DB2 - CLIST CALCULATIONS - PANEL 1
====>
You can update the DSMAX, EDMPOOL STATEMENT CACHE (if CACHE DYNAMIC is YES),
EDM DBD CACHE, SORT POOL, and RID POOL sizes if necessary.
                Calculated  Override
1  DSMAX - MAXIMUM OPEN DATA SETS   =   20000          (1-200000)
2  DSNT485I EDM STATEMENT CACHE      =  115836 K         K
3  DSNT485I EDM DBD CACHE            =   23400 K         K
4  DSNT485I EDM SKELETON POOL SIZE   =    9028 K         K
5  DSNT485I EDM LIMIT BELOW THE BAR =     0 K           K
6  DSNT485I BUFFER POOL SIZE        =     109 M
7  DSNT485I SORT POOL SIZE          =   10000 K         K
8  DSNT485I RID POOL SIZE            =  400000 K         K
9  DSNT485I DATA SET STORAGE SIZE   =  100000 K
10 DSNT485I CODE STORAGE SIZE        =   38200 K
11 DSNT485I WORKING STORAGE SIZE     =   45024 K
12 DSNT486I TOTAL MAIN STORAGE       =     688 M
13 DSNT487I TOTAL STORAGE BELOW 16M =   1036 K WITH SWA ABOVE 16M LINE
14 DSNT438I IRLM LOCK MAXIMUM SPACE =   2160 M, AVAILABLE = 2160 M

PRESS: ENTER to continue RETURN to exit  HELP for more information

```

Figure 69. CLIST calculations panel 1: DSNTIPC

#### Related tasks:


Calculating storage requirements with the installation CLIST

 Estimating the storage needed for locks (DB2 Performance)

#### Related reference:

DSNTIPD: Sizes panel 1

#### Related information:

 DSNT438I (DB2 Messages)

## DSMAX field (DSMAX subsystem parameter)

The DSMAX subsystem parameter specifies the maximum number data sets that can be open at one time.

How DB2 enforces the limit depends on the DSMAX value:

- If the value is less than 32,768, when the DSMAX value is reached, new OPEN statements do not fail and are allowed to continue, unless the number of open data sets reaches 32,768.
- If the value is 32,768 or greater, when the DSMAX value is reached, new OPEN statements begin to fail with reason code 00C20113.

To minimize situations in which OPEN statements fail, DB2 tracks the number of open data sets. When the number of open data sets reaches the value of DSMAX, DB2 closes a number of data sets so that additional data sets can be opened.

Acceptable values: 1 - 200000

Default:	based on calculations
Update:	enter a value in the override column
DSNZPxxx:	DSN6SPRM DSMAX

Use z/OS Version 1 Release 13 or later for any DB2 subsystem that has a DSMAX setting greater than 100,000.

Although the maximum number of data sets is 200,000, the practical limit can be less than 30,000, depending on available storage below the line. The value that you enter can substantially influence the performance of DB2.

If you use z/OS Version 1 Release 12 or later, complete one of the following actions to improve the performance of opening and closing data sets:

- Update the ALLOCxx parmlib member to set the SYSTEM MEMDSENQMGMT value to ENABLE.
- Issue system command SETALLOC SYSTEM,MEMDSENQMGMT=ENABLE.

It is best to update the ALLOCxx parmlib because the change remains effective across IPLs. If the SETALLOC command is used to enable SYSTEM MEMDSENQMGMT, you must restart DB2.

When a secondary index is nonpartitioned, the number of data sets that are required for the index is dependent on the total required space to contain the tree structure and on the size limit of each data set. When a secondary index is data-partitioned, the number of data sets that are required for the index is equal to the number of data partitions in the table space that contains the table. Unless a small piece size is used for nonpartitioned secondary indexes, partitioning generally results in an increase in the number of data sets for the index.

If the partitioning of secondary indexes causes the number of data sets to increase or decrease appreciably, you can modify the value of DSMAX. The default value for DSMAX is calculated by DB2 and does not count partitioned objects. Choose the value for DSMAX according to the impact that partitioning secondary indexes has on the number of data sets for those objects. DB2 defers closing and deallocating table spaces or indexes until the number of open data sets reaches the operating system limit or approaches the value that is specified by DSMAX.

**Related concepts:**


 [How DB2 determines the initial value of DSMAX \(DB2 Performance\)](#)

**Related tasks:**

 [Managing the opening and closing of data sets \(DB2 Performance\)](#)

 [Evaluating the value of DSMAX \(DB2 Performance\)](#)

**Related information:**

 [00C20113 \(DB2 Codes\)](#)

## **EDM STATEMENT CACHE field (EDMSTMTC subsystem parameter)**

The EDMSTMTC subsystem parameter determines the amount of EDM storage, in kilobytes, that is to be used for cached dynamic statements. This storage pool is located above the 2 GB bar.

Acceptable values: 5000 to 1048576  
Default: 113386<sup>1</sup>  
Update: press ENTER on panel DSNTIPB  
DSNZPxxx: DSN6SPRM EDMSTMTC

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNITPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST

The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:


- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

**Related tasks:**

Calculating storage requirements with the installation CLIST

Calculating EDM pool sizes

**Related reference:**

 -SET SYSPARM (DB2) (DB2 Commands)

## EDM DBD CACHE field (EDMDBDC subsystem parameter)

The EDMDBDC subsystem parameter determines the minimum size (in KB) of the DBD cache that is to be used by the environmental descriptor manager (EDM).

Acceptable values: 5000 to 2097152  
Default: 23400<sup>1</sup>  
Update: press ENTER on panel DSNTIPB  
DSNZPxxx: DSN6SPRM EDMDBDC

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNITPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST


The default value for EDM DBD CACHE is the larger of the EDM calculated value or 5000 K.

You can use the SET SYSPARM command to change this value. This value is used at DB2 startup time as the minimum value. This value cannot be decreased below the value that is specified at DB2 startup. This storage pool is located above the 2 GB bar.

**Related tasks:**

Calculating EDM pool sizes

**Related reference:**

 -SET SYSPARM (DB2) (DB2 Commands)

## EDM SKELETON POOL SIZE field (EDM\_SKELETON\_POOL subsystem parameter)

The EDM\_SKELETON\_POOL subsystem parameter determines the minimum size of the EDM skeleton pool in KB.

Acceptable values:	5120 to 2097152
Default:	10240 <sup>1</sup>
Update:	press ENTER on panel DSNTIPB
DSNZPxxx:	DSN6SPRM EDM_SKELETON_POOL

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST

The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:


- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

You can change this value by using the SET SYSPARM command. The setting is used at DB2 start time. The skeleton pool, which is located above the bar, is a component of EDM for storing skeleton package tables (SKPTs), where each SKPT represents a package.

**Related tasks:**

Calculating EDM pool sizes

**Related reference:**

 -SET SYSPARM (DB2) (DB2 Commands)

## EDM LIMIT BELOW THE BAR (EDMPOOL subsystem parameter)

The EDMPOOL subsystem parameter determines the maximum KB of storage below the 2 GB bar that can be consumed by the environmental descriptor manager (EDM). A value of 0 means that 31-bit EDM consumption is unbounded.

Acceptable values:	0 to 2097152
Default:	0
Update:	press ENTER twice on panel DSNTIPB
DSNZPxxx:	DSN6SPRM EDMPOOL

EDM does not allocate storage below the bar from the thread level pool except to process a package or plan that was last bound or re-bound prior to DB2 10. If you



are migrating to DB2 10, override the default setting with the EDMPOOL value that you currently use in the previous release.

**Recommendation:** To eliminate use of storage below the bar, re-bind all packages and plans after DB2 enters conversion mode (from Version 8 or Version 9). If you have native SQL procedures that were bound on a prior release, use ALTER REGENERATE to eliminate the use of below-the-bar storage for those procedures.

If the specified limit is reached or a new request would otherwise exceed the limit, DB2 issues a resource unavailable message, and the requested operation is not performed.

The EDMPOOL parameter can be changed online. When you dynamically update EDMPOOL by using the SET SYSPARM command, you can set EDMPOOL to any acceptable value.

**Related tasks:**

Calculating EDM pool sizes

## BUFFER POOL SIZE field

The value of the BUFFER POOL SIZE field is the buffer pool size that is calculated by the CLIST.

Acceptable values:	none
Default:	101 M <sup>1</sup>
Update:	run CLIST again
DSNZPxxx:	none

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNITPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST

The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

This field is protected and cannot be changed during update processing. If you want to change the size of a buffer pool, you must use the command ALTER BUFFERPOOL.

**Related reference:**

 -ALTER BUFFERPOOL (DB2) (DB2 Commands)

## SORT POOL SIZE field (SRTPOOL subsystem parameter)

The SRTPOOL subsystem parameter specifies the amount of storage in kilobytes that is needed for the sort pool.

Acceptable values:	240 to 128000
--------------------	---------------

Default:	10000 <sup>1</sup>
Update:	press Enter twice on panel DSNTIPB
DSNZPxxx:	DSN6SPRM SRTPOOL

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST



The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

If you decide to change this field, estimate the sort pool value by using the following formula:

$$32000 * (16 + \text{sort key length} + \text{sort data length})$$

**Related tasks:**

-  Improving the performance of sort processing (DB2 Performance)
-  Choosing buffer pool sizes (DB2 Performance)

## RID POOL SIZE field (MAXRBLK subsystem parameter)

The MAXRBLK subsystem parameter specifies the amount of storage in kilobytes that is needed for the RID pool.

Acceptable values:	0, 128 - 2000000
Default:	400000 <sup>1</sup>
Update:	press Enter twice on panel DSNTIPB
DSNZPxxx:	DSN6SPRM MAXRBLK

**Notes:**

1. DB2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, DB2 10 uses the DB2 9 field value. For more information, see Calculating storage requirements with the installation CLIST

The **Override** column of panel DSNTIPC controls whether DB2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.


If you decide to change this field, estimate the storage that is required for the RID pool by using the following formula:

Number of concurrent RID processing activities \*  
average number of RIDs \* 2 \* 5 (bytes per RID)

Choosing 0 disables the use of the RID pool. In this case, DB2 does not use access paths or join methods that depend on RID pool storage.

This storage is located above the 2 GB bar.

**Related tasks:**

 [Managing RID pool size \(DB2 Performance\)](#)

**Related reference:**

MAX TEMP RID field (MAXTEMPS\_RID subsystem parameter)

## CLIST messages fields for panel DSNTIPC

The CLIST messages fields display storage sizes that are calculated by the CLIST. These fields are protected and cannot be changed by the user.

Acceptable values:	none
Default:	none
Update:	run CLIST again
DSNZPxxx:	none

## Storage messages fields

The storage messages fields indicate the results of the calculations described on panel DSNTIPC. These fields are protected and cannot be changed by a user.

Acceptable values:	none
Default:	none
Update:	run CLIST again
DSNZPxxx:	none

---

## DSNTIPC1: CLIST calculations panel 2

The DSNTIPC1 panel displays CLIST messages that indicate a variety of calculations. This panel is displayed only when you run the CLIST in INSTALL mode.

```

DSNTIPC1      INSTALL DB2 - CLIST CALCULATIONS - PANEL 2
====>  _
1 DSNT488I  DATA SETS CREATED BY THE INSTALLATION CLIST
          WILL REQUIRE AT LEAST 4000 KILOBYTES (83 TRACKS)
2 DSNT488I  OTHER NON-VSAM DATA SETS CREATED BY INSTALLATION AND IVP JOBS
          WILL REQUIRE AT LEAST 4000 KILOBYTES (83 TRACKS)
3 DSNT488I  DATA SETS FOR STORAGE GROUPS CREATED BY INSTALLATION AND IVP JOBS
          WILL REQUIRE AT LEAST 44360 KILOBYTES (924 TRACKS)
4 DSNT488I  VSAM DATA SETS CREATED FOR THE DB2 CATALOG AND DIRECTORY
          WILL REQUIRE AT LEAST 323972 KILOBYTES (6749 TRACKS)
5 DSNT488I  VSAM DATA SETS CREATED FOR DB2 CATALOG AND DIRECTORY INDEXES
          WILL REQUIRE AT LEAST 250764 KILOBYTES (5224 TRACKS)
6 DSNT488I  VSAM DATA SETS CREATED FOR ACTIVE LOG 1 AND BSDS 2
          WILL REQUIRE AT LEAST 103980 KILOBYTES (2166 TRACKS)
7 DSNT488I  VSAM DATA SETS CREATED FOR ACTIVE LOG 2 AND BSDS 1
          WILL REQUIRE AT LEAST 103980 KILOBYTES (2166 TRACKS)
-----
8 DSNT488I  DATA SETS CREATED FOR DB2 INSTALLATION AND VERIFICATION
          WILL REQUIRE AT LEAST 835056 KILOBYTES (17397 TRACKS)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 70. CLIST calculations panel 2: DSNTIPC1

## CLIST messages fields for panel DSNTIPC1

The messages in these fields might be used depending on how many unique volume names were supplied on installation panel DSNTIPA2. These fields are protected and cannot be changed.

Acceptable values:	none
Default:	none
Update:	run CLIST again
DSNZPxxx:	none

---

## Completing the CLIST processing

On the last panel that displays CLIST calculations, you can complete CLIST processing by pressing Enter. In INSTALL mode, this panel is DSNTIPC1. In MIGRATE mode, this panel is DSNTIPC. After pressing Enter, you receive a series of messages that provide details about the CLIST processing.

### CLIST messages

The CLIST issues messages as it completes processing.

You first receive the following message:  
DSNT478I BEGINNING EDITED DATA SET OUTPUT

The CLIST is checking the parameter values that you entered. If it detects a problem, you receive an error or warning message indicating the name of the parameter and the type of problem. If you receive an error message, the CLIST cannot edit the installation or migration jobs properly. If you receive a warning message, check the conditions. A warning message can sometimes be issued even when the conditions are normal or acceptable. If you specify several large numbers in the panels, the CLIST might send a message indicating an overflow in CLIST arithmetic.

At this point the CLIST displays the Main Panel again. You can proceed through the panels, rechecking or changing parameter values.

If the CLIST does not find any errors, you receive messages on DSNTIPC1 that indicate the amount of required disk storage and virtual storage. You might also receive some other information messages. For example, if you specified an existing data set for the TEMP CLIST LIBRARY field or the SAMPLE LIBRARY field on panel DSNTIPT, the following message is displayed:

```
WARNING(S) ISSUED
```

**Related reference:**

DSNTIPC1: CLIST calculations panel 2

## Installation and migration jobs that the CLIST tailors

The installation CLIST tailors each installation or migration job according to the panel values that you specified.

For each edited job, you receive the following message:

```
DSNT489I CLIST EDITING dsname(member), explanation
```

**Important:** If an error occurs while the installation CLIST edits your jobs, you receive the following message:

```
IKJ52506I TEXT NOT FOUND
```

Enter END NOSAVE to prevent modification of the original copies of your installation or migration jobs.

You can rerun the CLIST with the trace control parameter set to CONTROL(SYMLIST) to learn what caused the problem. In some cases, specifying CONTROL(LIST) as the trace control parameter may provide enough information for you to find the source of the problem.

After the CLIST finishes tailoring the jobs, it displays the Main Panel again. If you need to continue your tailoring at another time, conclude this session. Then, when you start a new session, use the value that you specified for OUTPUT MEMBER NAME during this session as the value for INPUT MEMBER NAME during the new session. Enter these values on the Main Panel.

The installation CLIST uses the values that you specify on the installation panels to tailor and load the installation or migration jobs. Each job is composed of one or more JCL procedures or job steps. The CLIST loads each job as a separate member of the newly created *prefix.NEW.SDSNSAMP*. Before you run any of these jobs, however, you might want to perform some editing that the CLIST does not do. If disk allocation is completely controlled by SMS for your installation, verify that the input to IDCAMS from the installation jobs does not conflict with the requirements for SMS.

Which jobs you edit depends on the task that you are performing: installation, migration, or update. In data sharing environments, you edit different jobs depending on the data sharing function: group, member, or enable. The installation CLIST tailors a different set of jobs for each task.

**If you are installing,** the CLIST tailors the following jobs:

DSNTEJ0	DSNTEJ2E	DSNTEJ6U	DSNTESD	DSNTIJMV
DSNTEJ1	DSNTEJ2F	DSNTEJ7	DSNTESE	DSNTIJRT
DSNTEJ1L	DSNTEJ2H	DSNTEJ71	DSNTIJCA	DSNTIJRV
DSNTEJ1P	DSNTEJ2P	DSNTEJ73	DSNTIJDE	DSNTIJRW
DSNTEJ1S	DSNTEJ3C	DSNTEJ75	DSNTIJEX	DSNTIJSG
DSNTEJ1T	DSNTEJ3M	DSNTEJ76	DSNTIJIC	DSNTIJTC
DSNTEJ1U	DSNTEJ3P	DSNTEJ77	DSNTIJID	DSNTIJTM
DSNTEJ2A	DSNTEJ4C	DSNTEJ78	DSNTIJIE	DSNTIJUZ
DSNTEJ2C	DSNTEJ4P	DSNTESA	DSNTIJIF	DSNTIJVC
DSNTEJ2D	DSNTEJ67	DSNTESE	DSNTIJIN	

If you specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ2U, DSNTEJ6O, DSNTEJ6R, DSNTEJ6V, and DSNTEJ6W.

If you activated DDF and specified a value in the REMOTE LOCATION field of panel DSNTIPY, the CLIST also tailors job DSNTEJ6.

If you activated DDF and specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ6Z, DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66.

If you activated DDF, specified a value in the REMOTE LOCATION field of panel DSNTIPY, and specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ6D, DSNTEJ6P, DSNTEJ6S, DSNTEJ6T, DSNTEJ61, and DSNTEJ62.

If CICS is selected, the CLIST edits DSNTEJ5A, DSNTEJ5C, and DSNTEJ5P.

If you are using data sharing, the CLIST edits DSNTIJGF and DSNTIJFT.

The installation CLIST tailors the DSNHC, DSNH, DSNU, and DSNEMC01 CLISTs for installation.

**If you are migrating to conversion mode (from Version 8 or Version 9),** the CLIST tailors the following jobs:

DSNTIJCX	DSNTIJIN	DSNTIJRV	DSNTIJTM
DSNTIJEX	DSNTIJMV	DSNTIJRW	DSNTIJUZ
DSNTIJFV	DSNTIJRI	DSNTIJSG	DSNTIJVC
DSNTIJIC	DSNTIJRT	DSNTIJTC	

The CLIST also tailors the DSNH, DSNHC, DSNU, and DSNEMC01 CLISTs for migration to conversion mode (from Version 8 or Version 9).


**If you are updating,** the CLIST tailors the following jobs: DSNTIJRT and DSNTIJUZ. DSNTIJRT is updated only if you select installation panel DSNTIPR1.

**If you are migrating to new-function mode,** the CLIST tailors the following jobs: DSNTIJEN, DSNTIJNF, DSNTIJES, DSNTIJCS, DSNTEJxx, DSNTIJNG, and DSNTIJNH.

All of these jobs are described in the following topics. Recovery information is provided, along with a description of each job. Unless otherwise stated in the job description, a return code of 0 or 4 from any of the jobs indicates successful completion. Some of the jobs contain statements that could fail without causing the job to fail. For instance, delete commands for data sets, drop statements for SQL objects, and stop commands could fail when you first run a job because the data sets or objects do not exist. Unless otherwise stated, you can ignore these failures. The statements are needed to allow you to rerun the job (if necessary) without performing the deletes, drops, and stops manually; they are merely for cleanup or initialization processing.

When a job fails, follow the instructions that are provided in the recovery information for the job.

**Related information:**

 [DSNT489I \(DB2 Messages\)](#)

## Tailoring the installation jobs

You might want to tailor several items in the installation jobs, such as data set names or library names, to meet the requirements of your site.

### About this task

The changes that are described below are general; that is, they apply to all the jobs processed by the CLIST.

Before you begin editing, you might want to print or back up the jobs. You can print the JCL for these jobs by using IEBPTPCH or any other print facility that is available at your site.

### Procedure

To prepare the installation jobs for your site:

1. Tailor the jobs to suit the needs of your site. You should edit the jobs to conform to any unique requirements that you might have. Also, you might want to make any minor JCL changes for items that the ISPF panels did not handle.
2. If you specified volume serial numbers on installation panel DSNTIPA3, examine the volume serial numbers that are used in the various jobs. The volume serial number fields of installation panel DSNTIPA3 enable you to specify up to five volumes for the data sets that are defined during installation or migration. If you want to use more than five volumes, specify them before continuing with installation or migration tasks.

If you specified volume serial numbers on installation panel DSNTIPA3, the DSNTINST CLIST spreads the data sets across these volumes. If you use explicit volume serials instead of SMS, adding more volumes to provide more separation of data sets can help improve system performance and recoverability. Many of the log data sets are large and easy to place on separate volumes. The CLIST produces a series of messages that estimate space for each type of data set that is created during the installation or migration process.

3. Edit the DSNH CLIST if needed. The DSNH CLIST allows you to precompile, compile, prelink-edit, link-edit, bind, and run an application by issuing a single command. You might need to edit the DSNH CLIST to change values for some of the entries. Verify that DSNH keyword parameters for all DB2-supported compilers that your applications use.

- a. Check the default data set names for the licensed programs that you have installed. These defaults are in the parameter definitions at the beginning of each program. If the names and prefixes are not correct for your site, change them.
- b. Check default library names. If the names and prefixes are not correct for your site, change them. Ensure that the data sets exist and are cataloged for BLIB, CLIB, LLIB, and PLIB. When the DSNH CLIST runs, it creates DBRMLIB and LOAD data sets if they do not already exist. The DBRMLIB data set is created only if the DBRMLIB(DEFAULT) is set. The following are the default library names:
  - BLIB(NONE)
  - DBRMLIB(DEFAULT) - The DBRM library must be allocated exclusively when the precompiler writes to it.

**Recommendation:** Set up a temporary library, or one per user, rather than trying to share libraries.

- CLIB(NONE)
- LLIB(NONE)
- LOAD(RUNLIB.LOAD) - This library is allocated exclusively when it is being written.

**Recommendation:** Set up a temporary library, or one per user, rather than trying to share libraries.

- PLIB(NONE)
- c. Check default processor options. If you prefer other default options, change them. The default processor options follow:

CICSOPT(NONE)	LOPTION(NONE)
COPTION(NONE)	PASS(DEFAULT)

- d. Check print and work space defaults. If the default allocation sizes are not acceptable for your site, change them. The print and work space defaults follow:

PSECSPEC(20)	WSECSPEC(20)
PSPACE(20)	WSPACE(20)
WORKUNIT(DEFAULT)	

4. Examine the data set names for other products. Many data set names for other products appear in the jobs. These names are shown in the table on panel DSNTIPU. Change them if they are different at your site.

**Related reference:**

DSNTIPA3: Data parameters panel:

DSNTIPU: Data set names panel 2

 [DSNH \(TSO CLIST\) \(DB2 Commands\)](#)

## Job DSNTIJUZ and the subsystem parameter load module, application defaults load module, and DSNHMCID

Job DSNTIJUZ generates the subsystem parameter module each time that you install, migrate, or update DB2. DSNTIJUZ also creates the application defaults load module and DSNHMCID.



Several macros expand to form the data-only subsystem parameter load module, which contains the DB2 execution-time parameters that you selected using the ISPF panels. The macros are:

- DSN6ARVP
- DSN6FAC
- DSN6LOGP
- DSN6SPRM
- DSN6SYSP
- DSN6GRP

Job DSNTIJUZ also generates the application defaults load module (referred to here as *dsnhdcp* with either the traditional name of DSNHDECP or a user-specified name. DB2 is shipped with a default *dsnhdcp* module called DSNHDECP for compatibility with older applications. You cannot start DB2 or precompile applications with the default *dsnhdcp* module. During DB2 start-up processing or for jobs that precompile a DB2 application, you must ensure that the *dsnhdcp* module that was created by job DSNTIJUZ resides in a library, usually *prefix.SDSNEXIT*, that is concatenated before the *prefix.SDSNLOAD* library where the DB2-supplied *dsnhdcp* resides.

Job DSNTIJUZ also creates the data-only load module DSNHMCID, which contains the EBCDIC CCSIDs for text conversion in offline messages. When you install DB2, job DSNTIJUZ creates DSNHMCID in *prefix.SDSNEXIT* and *prefix.SDSNLOAD*.

In general, DSNHMCID should exist in both *prefix.SDSNEXIT* and *prefix.SDSNLOAD*. If it cannot reside in *prefix.SDSNLOAD*, take one of the following actions:


- Include *prefix.SDSNEXIT* before *prefix.SDSNLOAD* in the system link list.
- Include *prefix.SDSNEXIT* before *prefix.SDSNLOAD* in the JOBLIB or STEPLIB statements for all DB2 applications, address space start-up procedures, TSO log-on procedures, CICS tasks, and IMS tasks that use DB2.

DB2 allows online changes to many of the subsystem parameters. The SET SYSPARM command enables a function that allows reloading.

**Related tasks:**

Migration step 11: Define DB2 initialization parameters: DSNTIJUZ

**Related reference:**

 -SET SYSPARM (DB2) (DB2 Commands)

Directory of subsystem parameters, panel fields, and application default values

---

## Updating subsystem parameter and application default values

You can dynamically update the value of some subsystem parameters while DB2 is running. For other subsystem parameters, you must stop and restart DB2 to change the values.

### Before you begin

**Important:** Changes to subsystem parameters affect the entire subsystem. Carefully evaluate and plan for the impact of any changes to these values. Also, follow any advice that is included in the documentation for the parameter.

Determine whether you will update the subsystem parameter values online or offline. Not all parameters can be updated online. To check whether a particular subsystem parameter can be updated online, see Directory of subsystem parameters, panel fields, and application default values.

## About this task

When you update subsystem parameter values, DB2 does not generate a complete list of installation or migration jobs, as it did during the installation and migration process. Instead, the update process generates only one job, DSNTIJUZ. This job assembles and link-edits the DB2 data-only subsystem parameter module and the application defaults load module (*dsnhdcp*).

**Restriction:** The following procedure cannot be used for some subsystem parameters that define characteristics of the DB2 catalog, directory, BSDS, and logs or for the DDF subsystem parameter. For these parameters, follow the instructions in Updating subsystem parameters that cannot be updated by using DSNTIPB.

## Procedure

**GUIP** To update subsystem parameter values, complete the following steps:

1. Invoke the installation CLIST.
2. On installation panel DSNTIPA1, in field 1 INSTALL TYPE, specify UPDATE and press Enter.
3. On installation panel DSNTIPT, in field 2 SAMPLE LIBRARY, specify the output SDSNSAMP data set and press Enter. Panel DSNTIPB is displayed.
4. On panel DSNTIPB, specify the installation panel that you want to update and press Enter.
5. Change the values on the panel as needed, and press Enter to return to panel DSNTIPB.
6. Optional: Repeat steps 4 - 5 until you specify all of the updates that you want.
7. On panel DSNTIPB, press ENTER again to complete the update process.  
This process produces a new DSNTIJUZ job with the new values; it also saves these values in the file that is specified as the OUTPUT MEMBER NAME field on panel DSNTIPA1. For more information, see OUTPUT MEMBER NAME field.
8. Assemble and link edit the new DSNTIJUZ job, and then submit the job to create the new load module with the new subsystem parameter values.
9. Use one of the following methods to tell the subsystem to begin using the new load module:

- For online updates, issue the SET SYSPARM command:  
`SET SYSPARM LOAD(load-module-name)`

where *load-module-name* is the same as the output member name in step 1.

If you want to specify the load module name that is used during DB2 startup, you can issue the following command:

```
SET SYSPARM RELOAD
```

- For offline updates, stop and restart DB2 with the new subsystem parameter load module. **GUIP**

**Related concepts:**

Job DSNTIJUZ and the subsystem parameter load module, application defaults load module, and DSNHMCID

**Related tasks:**

- Optimizing subsystem parameters (DB2 Performance)
- Optimizing subsystem parameters for SQL statements by using profiles (DB2 Performance)

**Related reference:**

DSNTIPA1: Main panel

DSNTIPT: Data set names panel 1

DSNTIPB: Update selection menu panel

- -SET SYSPARM (DB2) (DB2 Commands)
  - Subsystem parameters (Introduction to DB2 for z/OS)
  - Application programming default values (Introduction to DB2 for z/OS)
- Directory of subsystem parameters, panel fields, and application default values
- Bootstrap data set (Introduction to DB2 for z/OS)

## DSNTIPB: Update selection menu panel

During the update process, the DSNTIPB panel allows you to access all the installation panels and view the values that you specified during installation or migration.

Parameters that you can update are highlighted. Panels containing fields that cannot be updated are marked with an asterisk.

```
DSNTIPB          UPDATE DB2 - SELECTION MENU
====>

Select one of the following:
1 CATALOG AND DIRECTORY          19 PERFORMANCE AND OPTIMIZATION
2 DATA PARAMETERS PANEL         20 IRLM PANEL 1
3 DEFINE GROUP OR MEMBER        21 IRLM PANEL 2
4 SYSTEM RESOURCE DATA SET NAMES 22 DB2 UTILITIES PARAMETERS
5 DATA SET NAMES PANEL 1       23 DB2 UTILITIES PARAMETERS PANEL 2
6 DATA SET NAMES PANEL 2 *     24 PROTECTION
7 DATA SET NAMES PANEL 3 *     25 PROTECTION PANEL 2
8 SIZES                          26 MVS PARMLIB UPDATES
9 SIZES PANEL 2                  27 ACTIVE LOG DATA SET PARAMETERS
10 WORK FILE DATABASE            28 ACTIVE LOG CHECKPOINT PARAMETERS
11 THREAD MANAGEMENT            29 ARCHIVE LOG DATA SET PARAMETERS
12 BUFFER POOL SIZES PANEL 1     30 DATABASES TO START AUTOMATICALLY
13 BUFFER POOL SIZES PANEL 2 *   31 DISTRIBUTED DATA FACILITY
14 TRACING AND CHECKPOINT PARAMETERS 32 DISTRIBUTED DATA FACILITY PANEL 2
15 OPERATOR FUNCTIONS           33 ROUTINE PARAMETERS
16 DEFAULT STARTUP MODULES       34 PARAMETERS FOR DB2-SUPPLIED ROUTINES
17 APPLICATION PROGRAMMING DEFAULTS 1 35 DATA DEFINITION CONTROL SUPPORT
18 APPLICATION PROGRAMMING DEFAULTS 2 36 JOB EDITING
* None of the fields on these panels can be updated.
PRESS: ENTER to continue  RETURN to exit  HELP for more information
```

Figure 71. Individual update menu panel: DSNTIPB

### Panels to update field

From the DSNTIPB panel, you can select a family of parameters to display and update. Some parameters cannot be updated.

On the command line, enter a number to select the family of parameters that you want to update. These numbers correspond to the installation panels in the following table.

*Table 63. Panel names and identifiers, by DSNTIPB panel to update field option values*

<b>Option Value</b>	<b>Panel Name and Identifier</b>
1	DSNTIPA2: DB2 catalog and directory panel
2	DSNTIPA3: Data parameters panel:
3	DSNTIPK: Define group or member panel
4	DSNTIPH: System resource data set names panel
5	DSNTIPT: Data set names panel 1
6	DSNTIPU: Data set names panel 2
7	DSNTIPW: Data set names panel 3
8	DSNTIPD: Sizes panel 1
9	DSNTIP7: Sizes panel 2
10	DSNTIP9: Work file database panel
11	DSNTIPE: Thread management panel
12	DSNTIP1: Buffer pool sizes panel 1
13	DSNTIP2: Buffer pool sizes panel 2
14	DSNTIPN: Tracing parameters panel
15	DSNTIPO: Operator functions panel
16	DSNTIPO3: Default startup modules panel
17	DSNTIPF: Application programming defaults panel 1
18	DSNTIP4: Application programming defaults panel 2
19	DSNTIP8: Performance and optimization panel
20	DSNTIPI: IRLM panel 1
21	DSNTIPJ: IRLM panel 2
22	DSNTIP6: DB2 utilities parameters panel 1
23	DSNTIP61: DB2 utilities parameters panel 2
24	DSNTIPP: Protection panel
25	DSNTIPP1: Protection panel 2
26	DSNTIPM: MVS PARMLIB updates panel
27	DSNTIPL: Active log data set parameters
28	DSNTIPL1: Checkpoint parameters
29	DSNTIPA: Archive log data set parameters panel
30	DSNTIPS: Databases and spaces to start automatically panel
31	DSNTIPR: Distributed data facility panel 1
32	DSNTIP5: Distributed data facility panel 2
33	DSNTIPX: Routine parameters panel
34	DSNTIPR1: Parameters for DB2-supplied routines panel
35	DSNTIPZ: Data definition control support panel
36	DSNTIPY: Job editing panel

When the panel that you select is displayed, enter the new parameters. Press the Enter key to return to the update selection menu panel. Make another panel selection, or press Enter again to process. Press End to leave the update selection menu panel and return to the main panel (DNSTIPA1).

**Related reference:**

DSNTIPA1: Main panel

## Updating subsystem parameters that cannot be updated by using DSNTIPB

Some subsystem parameters cannot be updated by using panel DSNTIPB.

### Procedure

To update subsystem parameters that you cannot update by using panel DSNTIPB:

- To update the CATALOG ALIAS and DEFINE CATALOG fields on DSNTIPA2, see Changing the high-level qualifier for DB2 data sets (DB2 Administration Guide). The CATALOG ALIAS parameter establishes an alias name for your ICF catalog. This name is also used as the high-level qualifier name for DB2 VSAM data sets. The DEFINE CATALOG parameter controls the creation of the ICF catalog.
- To update DB2 to use the distributed data facility (DDF), follow these steps:
  1. Go through the normal update process of running the CLIST to add DDF information to installation panel DSNTIPR.
  2. Run job DSNTIJUZ.
  3. Populate the CDB.
  4. Stop and start DB2.
  5. Bind or rebind these plans:

**GUPI**

```
BIND PLAN(DSNESPCS) PKLIST(*.DSNESPCS.DSNESM68)
ISOLATION(CS) ACTION(REPLACE)
```

```
BIND PLAN(DSNESPRR) PKLIST(*.DSNESPRR.DSNESM68)
ISOLATION(RR) ACTION(REPLACE)
```

```
BIND PLAN(DSNESPUR) PKLIST(*.DSNESPUR.DSNESM68)
ISOLATION(UR) ACTION(REPLACE)
```


**GUPI**

6. Start DDF if you specified COMMAND instead of AUTO as the DDF STARTUP OPTION on installation panel DSNTIPR.
- To change the data set sizes for the DB2 catalog and directory:
    1. Copy the catalog and directory table spaces.
    2. Stop the table spaces or their databases.
    3. Delete the data sets and redefine them, using VSAM commands.
    4. Use the RECOVER utility to recover the catalog and directory to the new data sets.
    5. Start the table spaces or databases again.
  - To change from single to dual logging for the active log:

1. Define the second copy of the log with a VSAM IDCAMS DEFINE statement. Refer to job DSNTIJIN, which contains the DEFINE statement for the first copy of the log.
  2. Run the DSNJU003 (change log inventory) utility. This adds the second copy of the log to the BSDS.
  3. Update the NUMBER OF COPIES field on installation panel DSNTIPH from 1 to 2.
  4. Run job DSNTIJUZ to make the change effective.
- To move or expand the bootstrap data sets, use the IMPORT and EXPORT commands of access method services. The bootstrap data sets are accessed using JCL when DB2 starts.
  - To access the log data sets, you can use stand-alone access macros or the IMPORT and EXPORT commands of access method service.
  - To change the number of data sets for active logs, you can use the DSNJU003 utility.

**Related tasks:**


Populating the communications database for use with TCP/IP

 [Defining a new integrated catalog alias \(DB2 Administration Guide\)](#)

**Related reference:**

 [DSNJU003 \(change log inventory\) \(DB2 Utilities\)](#)

**Related information:**

 [Recovering from active log failures \(DB2 Administration Guide\)](#)

---

## Chapter 5. Installing DB2

Installing DB2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access DB2 resources, and preparing DB2 for use. After you complete the installation steps, your DB2 subsystem will be in new-function mode. In new-function mode, all DB2 10 function is available for use.

### Before you begin

Before you begin installing DB2:

- Review the information about DB2 security with your system security administrator, and plan and implement your DB2 security environment. See in particular Defining RACF user IDs for DB2-started tasks (Managing Security) and Permitting RACF access (Managing Security), which can help you plan your security environment even if you use an alternative security product. After initial installation of DB2, subsequent installation tasks and jobs require specific authorization in order to connect to DB2.
- Complete the SMP/E steps, load the DB2 libraries, and run the installation CLIST to tailor the DB2 jobs to your environment.
- Define an SMS environment for DB2. At a minimum, the data sets for the DB2 catalog and directory must be SMS-managed. For information on using sample job DSNTIJSS to define an SMS environment for data sets that are associated with the DB2 catalog and directory, see Installation step 1: Define the SMS environment for DB2 catalog and directory data sets: DSNTIJSS.
- If you plan to have data sharing enabled (Enable option on panel DSNTIPP1), you should save all your jobs from the original installation or migration in a different data set than the enabling jobs. If you save them in *prefix.NEW.SDSNSAMP*, the jobs might be overwritten.
- See the DB2 Program Directory for keyword specifications used for Preventive Service Planning (PSP). Use Information/Access or the ServiceLink facility of IBMLink to check the most current information about DB2 and other products. Contact the IBM Support Center if you do not have access to IBMLink.

You must not use secondary authorization IDs to perform any of the following installation steps.

### Procedure

After you complete the SMP/E steps and run the installation CLIST, you can edit and run the jobs that install your DB2 DB2 10 subsystem. A new installation starts in new-function mode.

The following table identifies the steps that you perform to install DB2 10.

Table 64. Overview of steps for installing DB2 10

Step	Description	Job
1	Define the SMS environment for DB2 catalog and directory data sets.	DSNTIJSS
2	Define DB2 10 to z/OS, and build cataloged procedures.	DSNTIJMV

Table 64. Overview of steps for installing DB2 10 (continued)

Step	Description	Job
3	Optionally, define a new integrated catalog facility (ICF) catalog and alias.	DSNTIJCA
4	Define DB2 data sets.	DSNTIJIN
5	Define DB2 initialization parameters.	DSNTIJUZ
6	Initialize DB2 catalog and directory data sets.	DSNTIJID, DSNTIJIE, and DSNTIJIF
7	Optionally, prepare authorization exit routines.	DSNTIJEX
8	Optionally, prepare for SMF recording.	(none)
9	Optionally, establish subsystem security.	(none)
10	Establish the TSO environment for DB2.	DSNTIJVC
11	Optionally, connect DB2 to IMS.	(none)
12	Optionally, connect CICS to DB2.	(none)
13	IPL z/OS.	(none)
14	Start DB2 10.	(none)
15	Tailor the DB2 catalog.	DSNTIJTC
16	Define temporary work file table spaces and initial buffer pool sizes. Bind the packages for DB2 REXX Language Support.	DSNTIJTM
17	Define and bind DB2 objects and user-maintained databases.	DSNTIJSG
18	Optionally, populate the user-maintained databases, and, if you are using DDF, populate the communications database (within the DB2 catalog).	(none)
19	Configure DB2 for running stored procedures and user-defined functions.	(none)
20	Set up DB2-supplied routines.	DSNTIJRW, DSNTIJRT, and DSNTIJRV
21	Take an image copy of the DB2 catalog and directory.	DSNTIJIC
22	Set up the administrative task scheduler.	(none)
23	Run the installation verification procedure.	DSNTEJxx
24	Enable additional capabilities for DB2.	(none)

**Related concepts:**

Loading the DB2 libraries

**Related tasks:**

Strategy for creating a DB2 data sharing group

Tailoring DB2 jobs to your environment using the installation CLIST

**Related information:**

 [DB2 10 for z/OS Technical Overview \(IBM Redbooks\)](#)



---

## Installation step 1: Define the SMS environment for DB2 catalog and directory data sets: DSNTIJSS

All data sets for the DB2 catalog and directory must reside on SMS-managed storage and belong to a SMS data class that is defined with the extended addressability attribute.

### About this task

To define a data class with the extended addressability attribute, specify EXT in the DATA SET NAME TYPE field of the DATA SET CLASS DEFINE panel of ISMF and ensure that the automatic class selection (ACS) routine associates the DB2 catalog and directory data sets with this data class. Job DSNTIJSS shows how to create a stand-alone SMS environment for the DB2 catalog and directory data sets. DSNTIJSS is designed for use on systems that do not already have a SMS environment, but it can also be used as a reference for adapting an existing one. In particular, job step STEP061 shows an example of defining a data class with the extended addressability attribute, and job step STEP071 shows example ACS routines that associate the DB2 catalog and directory data sets with the data class and a storage class.

### Procedure

To create the stand-alone SMS environment for the DB2 catalog and directory:

1. Customize job DSNTIJSS according to the directions in the job prolog.
2. Run job DSNTIJSS.
3. To activate the SMS environment, use this z/OS command, where *scds-name* is the name of the SMS source control data set that was specified by DSNTIJSS:  

```
SETSMS SCDS(scds-name)
```

**Attention:** This command will deactivate any existing SMS environment that is defined from another SCDS.

---

## Installation step 2: Define DB2 to z/OS: DSNTIJMV

Job DSNTIJMV completes some of the steps that are required to identify DB2 to z/OS. These steps include updating members of SYS1.PARMLIB and SYS1.PROCLIB and creating Language Environment options data sets for the DB2 core WLM environment for Java routines.

### Before you begin

Before you begin to install DB2 10, you must have the prerequisite level of z/OS installed.

### About this task

Do not overwrite the entries for DB2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see Program properties table (PPT) (MVS Initialization and Tuning Reference).

## Procedure

To define DB2 to z/OS:

1. Run job DSNTIJMV. If job DSNTIJMV runs successfully, it produces return codes of 0.
2. Review the content of the Language Environment options data set and adjust the following environment variables as needed. The data set is created by DSNTIJMV and must be allocated by the JAVAENV DD of the address space procedure for the DB2 core WLM environment for Java routines.
  - `_CEE_ENVFILE`, if present, needs to be set to the name and path of the environment variable file that was created by job step DSNTIJR.
  - `JVMPROPS` needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
  - `DB2_BASE` and `JCC_HOME` need to be set to the names of the HFS directories that you selected for the DB2 for z/OS and JCC product classes.

## What to do next

z/OS requirements: Each DB2 and each IRLM that you define to z/OS in the IEFSSNxx PARMLIB member requires a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your DB2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs; otherwise, your subsystems might not start. If you need more than 165 LXs, use the NSYSLX option on the z/OS IEASYSxx PARMLIB member to increase this number.

For later diagnosis of IRLM problems, also ensure that the following requirements are met:

- Specify the IRLM dump formatting modules DXRRLM50, DXRRLM55, and DXRRLS55 in a BLSCUSER member in a data set that is in the system's PARMLIB concatenation.
- Copy the DXRRL186, DXRRLFTB, DXRRLM50, DXRRLM55, and DXRRLS55 modules from the IRLM SDXRRESL data set to a data set in the system's link list. Or, add the SDXRRESL data set to the system's link list in a PROGxx member of a data set in the system's PARMLIB concatenation. If you use more than one level of IRLM, you will need to use a STEPLIB concatenation when using IPCS to process dumps that are taken for the levels whose modules are not in the link list.

Additional changes to SYS1.PARMLIB and SYS1.PROCLIB: Because different sites have different requirements for identifying DB2 to z/OS, job DSNTIJMV cannot anticipate all the necessary updates. For this reason, the updates that job DSNTIJMV makes to SYS1.PARMLIB and SYS1.PROCLIB might be incomplete. You might have additional procedures of your own to rename. You can complete these updates either by making the updates directly in SYS1.PARMLIB and SYS1.PROCLIB, or by editing DSNTIJMV.

**Recommendation:** Edit the updates directly in SYS1.PARMLIB instead of submitting the updates in the DSNTIJMV step. For SYS1.PROCLIB, submit the procedure-update section of job DSNTIJMV. Before you make the updates, read the following information and examine job DSNTIJMV to study the updates that it makes. Then use an editor such as ISPF/PDF to make the updates to SYS1.PARMLIB.

## DSNTIJMV updates to SYS1.PARMLIB

Job DSNTIJMV updates the following SYS1.PARMLIB members: IEFSSNxx, IEAAPFxx or PROGxx, and LNKLSTxx.

- **IEFSSNxx**

This member contains an entry for every z/OS subsystem. DB2 adds to this list of entries, making one entry for DB2 and two entries for the IRLM. The second IRLM entry, whose subsystem name is JRLM, is there to make it easier to add a second IRLM to your system if the first is damaged. You must provide your own procedure to add JRLM. Unique names must be used for each entry.

z/OS provides subsystem entries for DB2 and IRLM in IEFSSN00. Examine these entries to determine whether they are appropriate for your needs. Make sure that a subsystem name appears only once in the subsystem name list.

Place the SMS line as the first line in an IEFSSNxx member. Place the primary system's record (JES2 or JES3) record next. Other products might affect the position of the entries during system initialization. The DB2 line should come after SMS, the JES subsystem, and other vendor products.

The DB2 entry has the following format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
      INITPARM('DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>>')
```

where:

**ssname**

is the DB2 subsystem name.

**DSN3INI**

is the name of the DB2 load module z/OS invokes during master scheduler initialization. This module must be located in a link list data set (or in SYS1.LINKLIB).

**DSN3EPX**

is the name of the DB2 load module that responds to DB2 requests that are received from the z/OS subsystem interface. (DB2 can be active or inactive when the requests are received.) This module must be located in a link list data set (or in SYS1.LINKLIB).

**cmd-prefix**

is the one- to eight-character command prefix.

The first character of the command prefix must be one of the following characters: @ # . / ' ) \* + - = < | & ! ; % \_ ? : ". The remaining characters of the command prefix must be one of the above characters, A-Z, or 0-9. Do not use the JES2 backspace character or command prefix character. The default is the hyphen (-).

Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign '-' to one subsystem and '-DB2A' to another. Similarly, you also cannot assign '?DB2' to one subsystem and '?DB2A' to another. You can assign '-DB2A' and '-DB2B' to different DB2 subsystems.

**scope**

is the one-character scope for the command prefix. DB2 registers its command prefix with the operating system. When this is done, the scope of the command prefix is controlled by the value you choose:

- S** Started; and the prefix is registered with Sysplex scope at DB2 startup instead of during z/OS IPL. This is the default.  
**Recommendation:** Choose S, which allows you to have a single IEFSSNxx PARMLIB member that all z/OS systems in the Sysplex can use. Choosing S also simplifies the task of moving a DB2 from one system to another; you can stop DB2 on one z/OS and start it up on another without having to re-IPL the system.
- M** z/OS system scope; the prefix is registered during z/OS IPL.
- X** Sysplex scope; the prefix is registered during z/OS IPL. As a result, this DB2 cannot be restarted on another z/OS without changing the definitions and re-IPLing both z/OSs.

**group-attach**

is the group attachment name, which is used for data sharing. You can specify this on installation panel DSNTIPK.

**subgroup-attach**

is the name of the subgroup attachment, which is used in data sharing environments to provide more control over how TSO, CAF, RRSAPF, JDBC, ODBC, and DB2 utilities connections find active DB2 subsystems. You can specify this value by entering a subgroup name in the SUBGRP ATTACH field on installation panel DSNTIPK.

- **IEAAPFxx or PROGxx**

Job DSNTIJMV updates IEAAPFxx to include the DB2 program libraries (*prefix.SDSNEXIT*, *prefix.SDSNLOAD*, *prefix.SDXRRESL*, and *prefix.SDSNLINK*) as APF-authorized libraries.

If a program library that contains DFSORT or DB2 Sort for z/OS is not already APF-authorized, you can edit DSNTIJMV to authorize it. To do this, you can include the authorization either in this list or in LNKSTxx. All libraries that are concatenated with *prefix.SDSNLOAD* in STEPLIB and JOBLIB statements must be APF-authorized. Ensure that the volume serial number in this member is the volume on which the data set resides.

If you are using the PROGxx member instead of the IEAAPFxx member, you need to update the member manually—job DSNTIJMV does not edit it.

- **LNKSTxx**

Job DSNTIJMV updates this member to include the DB2 load module library, *prefix.SDSNLINK*. If you moved the modules from *prefix.SDSNLINK* into another library, edit DSNTIJMV to include that library in the LNKSTxx member. If you have combined *prefix.SDSNLINK* and *prefix.SDSNLOAD* into one library, edit DSNTIJMV to include the combined library in the LNKSTxx member.

Any data set that is added to the LNKSTxx member must be cataloged in the master catalog of the system. This is normally true of *prefix.SDSNLINK*; however, if an alias points to a user catalog when you run DSNALLOC, *prefix.SDSNLINK* is cataloged in a user catalog. In this case, you must either ensure that *prefix.SDSNLINK* is also cataloged in the master catalog or give *prefix.SDSNLINK* a high-level qualifier other than *prefix*, the high-level qualifier for this release. You must give a high-level qualifier other than *prefix* to all release-sensitive data sets that are placed in the LNKSTxx member.

If you do not include the DFSORT library, the DB2 Sort for z/OS library, or both in the LNKSTxx member, you must provide a JOBLIB or STEPLIB statement for all utility jobs that include one of those libraries. You can accomplish this by placing a STEPLIB statement in DSNUPROC, which appears later in this job. If

you use customized modules and exits, *prefix*.SDSNEXIT must precede *prefix*.SDSNLOAD in JOBLIB and STEPLIB statements.

You must do additional editing for the SYS1.PARMLIB updates. If you are editing DSNTIJMV, rather than making the changes directly, you have two options. One option is to include additional entries for the SYS1.PARMLIB members (IEAAPFxx and LNKLSTxx) at the end of the existing entry list. The other option is to place the entries earlier in the list.

If you include them at the end of the existing SYS1.PARMLIB entries, ensure that commas (the continuation character) delimit each entry except the last.


Another SYS1.PARMLIB change to consider at this time is the extended common storage area (ECSA) size, which is specified in the CSA parameter of the IEASYS00 parameter. Ensure that you have specified an adequate size for this subsystem.

The IOP parameter is another SYS1.PARMLIB change to consider at this time. DB2 can schedule I/O priority. To enable this, you must:

- Use the IOP parameter to set the I/O priority for the address space of a performance group. The IOP parameter is in the IEAIPSxx member of SYS1.PARMLIB.
- Enable z/OS I/O priority scheduling by specifying IOQ=PRTY in the IEAIPSxx member of SYS1.PARMLIB.

You must issue an IPL command for z/OS for the PARMLIB updates to take effect. To avoid issuing an IPL command for z/OS during DB2 installation, you can make these updates and issue the IPL in advance of your DB2 installation or migration session.


**Related concepts:**

 [How DB2 assigns I/O priorities \(DB2 Performance\)](#)

**Related reference:**

COMMAND PREFIX field

**Related information:**

 [Using the command prefix facility \(z/OS MVS Planning: Operations\)](#)

## DSNTIJMV updates to SYS1.PROCLIB

Job DSNTIJMV updates SYS1.PROCLIB to include the DB2 procedures.

DSNTIJMV includes the following procedures, where *ssnm* is the subsystem name:

- System services address space startup procedure (must be named *ssnm*MSTR)
- Database services address space startup procedure (must be named *ssnm*DBM1)
- Distributed data facility address space startup procedure (must be named *ssnm*DIST)
- Administrative task schedule address space startup procedure
- z/OS Workload Manager (WLM) procedure
- Address space startup procedures for the DB2 core WLM environments (*ssnm*WLM1, *ssnm*WLMC, *ssnm*WLMC, *ssnm*WLMG, *ssnm*WLMJ, *ssnm*WLMM, *ssnm*WLMP, *ssnm*WLMR, *ssnm*WLMU, *ssnm*WLMW, and *ssnm*WLMX)
- IRLM address space startup procedure (IRLMPROC or user-defined address space name)
- Precompiler procedures
- Utilities procedure (DSNUPROC)

Examine the SYS1.PROCLIB updates carefully. You might want to use a procedure library other than SYS1.PROCLIB for the procedures. The first seven procedures are used for start-up tasks. The other procedures are used to prepare application programs for execution and to invoke DB2 utilities. The program preparation procedures are required for the sample applications and can be helpful in generating other JCL procedures.

Change any data set names that differ at your site. If you specified a data set name suffix in the DATA SET NAME SUFFIX field of DSNTIPA1, that suffix is appended to data sets &USER..DBRMLIB.DATA, &USER..RUNLIB.LOAD, and &USER..SRCLIB.DATA. To override these data set names, you must edit the updates to SYS1.PROCLIB.

The language preparation procedures in job DSNTIJMV use the DISP=OLD parameter to enforce data integrity. However, when the installation CLIST runs, the DISP=OLD parameter for the DBRM library data set is modified to DISP=SHR. This might cause data integrity problems when you run multiple precompiler jobs. To avoid these data integrity problems, if you are not using DFSMSdfp partitioned data set extended (PDSE), you must change the language preparation procedures (DSNHICOB, DSNHICB2, DSNHFOR, DSNHC, DSNHCPP, DSNHCPP2, DSNHPLI, DSNHASHM, and DSNHSQL) to specify the DISP=OLD parameter instead of the DISP=SHR parameter.

If compiler STEPLIB statements are needed, add them.

The STEPLIB concatenation of the *ssnmDBM1* address space procedure includes a commented-out DD for the IBM Language Environment data set SCEERUN. If your system does not include SCEERUN in the system link list, you must uncomment this DD. Also, if your system link list does not include the Language Environment data set SCEERUN2, you must add it to the STEPLIB concatenation of your *ssnmDBM1* address space procedure.

Examine the size of the private area on the DB2 start procedures. If necessary, modify the procedures to satisfy the requirements for environmental descriptor manager (EDM) pool size, buffers, number of data sets open, and amount of available private address space.

**Related tasks:**

Calculating working storage requirements

## Language Environment options data sets for the DB2 core Java WLM environment

Job DSNTIJMV creates the Language Environment options data sets for the DB2 core Java WLM environment.

Job step DSNTIJJ of DSNTIJMV creates the Language Environment options data set for DSNWLM\_JAVA, which is the WLM environment for DB2-supplied Java stored procedures and user-defined functions. This data set is allocated by the JAVAENV DD of the *ssnmWLMJ* address space procedure that is created in job step DSNTIPM of DSNTIJMV.

In job step DSNTIJJ, review and optionally update the *JAVA\_HOME* path, which is the path where the JDK is located.

Example: /usr/lpp/java150/J5.0

---

## Installation step 3: Define the ICF catalog and alias: DSNTIJCA (optional)

The ICF catalog is the VSAM object in which DB2 records the data sets that you create during installation. DB2 uses the catalog alias as the prefix for your DB2 VSAM data sets.

### About this task

Creating the catalog is optional. If you specified YES for the DEFINE CATALOG option on installation panel DSNTIPA2, you must create the catalog. Do not run this job if you want to use an existing ICF catalog and alias (that is, you specified NO for the DEFINE CATALOG parameter on installation panel DSNTIPA2). However, ensure that the ICF catalog that you are going to use is created and that you defined an ICF catalog alias.

### Procedure

To create the ICF catalog and its alias:

1. Before running job DSNTIJCA, examine the DEFINE UCAT statement carefully to ensure that the parameters are appropriate for your needs.
2. Run job DSNTIJCA.  
If DSNTIJCA runs successfully, it produces return codes of 0.
3. If DSNTIJCA fails or abends, delete the ICF catalog (if it was created) and run the job again.

#### Related tasks:

Installation step 1: Define the SMS environment for DB2 catalog and directory data sets: DSNTIJSS

#### Related reference:

DEFINE CATALOG field

---

## Installation step 4: Define system data sets: DSNTIJIN

Use job DSNTIJIN to define the VSAM and non-VSAM data sets for DB2.

### Before you begin

Before you define the system data sets, ensure that you have defined an SMS environment for data sets that are associated with the DB2 catalog and directory. Starting in DB2DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability.

### Procedure

To define system data sets:

1. Check the DEFINE CLUSTER statements in job DSNTIJIN to ensure that they allocate adequate disk space for your system.

**Recommendation:** For recovery purposes, place system data sets such as the DB2 recovery log and the VSAM catalog on different disk volumes. Because these data sets are used frequently, do not migrate them by using DFSMSHsm.


2. Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0 for all DEFINE statements and steps. Check any VSAM messages carefully.

3. If job DSNTIJIN fails or abends, complete the following steps:

- a. Remove the z/OS catalog delete statements from job DSNTIJDE.
- b. Run job DSNTIJDE. This job deletes the previously created data sets for the DB2 directory and DB2 catalog.
- c. Run DSNTIJIN again.

**Related concepts:**

 [Allocating and extending data sets \(DB2 Performance\)](#)

**Related tasks:**

Installation step 1: Define the SMS environment for DB2 catalog and directory data sets: DSNTIJSS

## Job DSNTIJIN

During installation, job DSNTIJIN defines VSAM and non-VSAM data sets for DB2.

DSNTIJIN performs the following tasks:

- Defines three non-VSAM data sets for the DB2 sample objects:
  - *prefix*.DBRMLIB.DATA
  - *prefix*.SRCLIB.DATA
  - *prefix*.RUNLIB.LOAD
- Defines the VSAM clusters for the bootstrap data sets.

Each bootstrap data set (BSDS) consists of a VSAM key-sequenced data set. You defined the BSDS names during the ISPF tailoring session
- Defines the VSAM clusters for the active log data sets.

You specified up to 93 primary active log data sets during the ISPF tailoring session (NUMBER OF LOGS field on installation panel DSNTIPL). You might also have requested dual logging to generate two copies of each active log data set. Consequently, job DSNTIJIN can define up to 186 active log data sets. If you specified that DSNTIJIN is to create fewer active log data sets, then after installation, you can run the DSNJU003 utility to add additional active log data sets to the BSDS.
- Defines the VSAM clusters for the task list data set of the administrative task scheduler.
- Defines the DB2 directory database.

Job DSNTIJIN creates and catalogs the DB2 directory database (DSNDB01). The DB2 directory database contains information that is required to start DB2 and is also used by DB2 during its normal operation. It contains table spaces and index spaces that the installation job allocates.
- Defines the DB2 catalog database.

Job DSNTIJIN creates and catalogs the DB2 catalog database (DSNDB06). The DB2 catalog contains information about every object that DB2 maintains.
- Invokes the LISTCAT command of access method service so that you can verify that the VSAM definitions were successful.



- Creates control intervals based on the value you specified in VARY DS CONTROL INTERVAL on panel DSNTIP7. If you specified YES, DB2 creates 4-KB, 8-KB, 16-KB, and 32-KB control intervals as appropriate in the AMS DEFINE CLUSTER commands for the DB2 catalog and directory data sets. If you specified NO, these data sets are created using a fixed control interval of 4-KB.

## Job DSNTIJDE

Job DSNTIJDE deletes the previously created data sets for the DB2 directory and DB2 catalog. If a job fails or abends, you might need to run DSNTIJDE job before restarting the DB2 installation process.

Job DSNTIJDE is not part of the normal installation process; use this job only for rerunning part of the process. Do not run this job during migration or fallback.

In most cases, you must remove or comment out the delete statement in this job for the ICF catalog (if the statement is present). The ICF catalog probably does not need to be deleted and redefined.

Deletes might fail for data sets that do not exist. This does not necessarily indicate that the job failed. If you receive other messages, check them carefully.

Job DSNTIJDE does not work properly if job DSNTIJSG or job DSNTIJTM has been executed. Job DSNTIJDE does not delete the resource limit specification table, the data sets that are used by the distributed data facility, or the data sets that are created for work file table spaces.

If job DSNTIJDE fails or abends, correct the error conditions and rerun the job. If you want to delete the ICF catalog, first list its contents and delete the data sets that are cataloged there. This could include sample data sets, user-defined data sets, or subsystem data sets that were not deleted properly. You can use a FORCE command to delete the user catalog. If you delete the catalog using FORCE before deleting all the data sets, you can use the RECATALOG option of DEFINE CLUSTER and delete the data sets.

---

## Installation step 5: Define DB2 initialization parameters: DSNTIJUZ

Job DSNTIJUZ generates the DB2 data-only load module DSNHMCID, the application defaults load module (*dsnhdecpl*), and the subsystem parameter module. The application defaults load module is the name that was specified for the APPL DEFAULTS field on installation panel DSNTIPO3. The subsystem parameter module is the name that was specified for the PARAMETER MODULE field on installation panel DSNTIPO3.

### Procedure

To define DB2 initialization parameters:

1. Verify that data sets that are allocated by the SYSLMOD DD statements of this job are also allocated by the STEPLIB DD statements of the DSNMSTR address space for DB2.
2. If the DB2 distribution library prefix is different from the target library prefix, edit DSNTIJUZ to correct the data set name for *prefix.ADSNLOAD*.
3. If you have not run the SMP/E ACCEPT job (DSNACEP1) of FMID HDBAA10, edit DSNTIJUZ to include the SMP/E temporary data set (SMPTLIB) in the concatenation for the ADSNLOAD DD statement in step DSNTIZQ. SMPTLIB

is *hlq*.HDBAA10.F2, where *hlq* is from the GLOBAL SMP/E zone. Use the following SMP/E statements to get DSPREFIX:

```
SET BOUNDARY (GLOBAL).  
LIST DDDEF ( SMPTLIB ).
```

4. Insert the DSPREFIX value after SDSNLOAD and ADSNLOAD.
5. Run job DSNTIJUZ.

If you want DSNTIJUZ to establish SMP/E GENASM entries in the DB2 system parameter (DSN6xxxx) and application defaults module macros, you need to uncomment job step DSNTIMQ. Advanced SMP/E skills are recommended for users of job step DSNTIMQ. Read the job step prolog before proceeding. You might receive message GIM65001 when you run steps DSNTLOG and DSNTIMQ, or you might receive a return code of 4 when you run step DSNTIMQ. You can ignore these messages.

6. If job DSNTIJUZ fails or abends, correct the problem and rerun the job.

**Related tasks:**

Installation step 6: Initialize system data sets: DSNTIJID, DSNTIJIE, and DSNTIJIF

**Related reference:**

DSNTIPO3: Default startup modules panel

Subsystem parameters that are not on installation panels

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## Installation step 6: Initialize system data sets: DSNTIJID, DSNTIJIE, and DSNTIJIF

After you define your system data sets and DB2 initialization parameters, you must initialize your system data sets.

### Procedure

To initialize system data sets:

Run the following jobs in the specified order:

1. DSNTIJID
2. DSNTIJIE
3. DSNTIJIF

- If the jobs run successfully, they produce return codes of 0. Otherwise, check for and resolve error conditions that might be reported by VSAM messages.
- If any of the jobs fail or abend, remove the ICF catalog delete statements (job step DSNTIVC) from job DSNTIJDE, run job DSNTIJDE, and then rerun the following jobs:
  - DSNTIJIN
  - DSNTIJUZ
  - DSNTIJID
  - DSNTIJIE
  - DSNTIJIF

### Results

Job DSNTIJID records the active log data set names to the BSDS, formats the active log data sets, and initializes the DB2 directory table spaces and indexes.

| Job DSNTIJIE initializes the DB2 catalog table spaces and indexes (through the  
| SYSGRTNS table space).

| Job DSNTIJIF initializes the remaining DB2 catalog table spaces and indexes.

| **Related concepts:**

| Installation step 7: Define user authorization exit routines: DSNTIJEX (optional)

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## Installation step 7: Define user authorization exit routines: DSNTIJEX (optional)

Job DSNTIJEX builds sample authorization exit routines from the source code in *prefix.SDSNSAMP*. These sample authorization exit routines are DSN3@SGN and DSN3@ATH, and the user version of the access control authorization exit routine, DSNX@XAC.

Job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. Then DSNTIJEX places the exit routines in the *prefix.SDSNEXIT* library. The DB2 CLIST tailors the JCL in DSNTIJEX to match your site's environment.

The sample authorization exit routines are not the same as the default authorization exit routines that are supplied by DB2. By implementing the sample authorization exit routines, you can provide group names as secondary authorization IDs. By modifying the sample authorization exit routines, you can tailor authorization processing for your subsystem.

DSNXSXAC is a copy of the default access control authorization exit routine that users can modify. This exit routine allows you to bypass some or most of DB2 authorization checking to specify your own authorization checking. If you do not modify it, this step is not needed and you should delete it.

DSNACICS is a stored procedure that invokes user exit routine DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. If you do not need to modify the caller's parameter values, you can use the default DSNACICX exit routine. However, if you need to modify the caller's parameter values, you need to perform the following tasks:

1. Write a user exit routine in assembler, COBOL, C, or PL/I
2. Assemble or compile the source code
3. Link-edit the object code into the DB2 exit routine library

Installation job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX. You can use this step as a model for your program preparation job.

You have the following options regarding exit routines:

- To use the sample authorization exit routines, run job DSNTIJEX.
- To use the default authorization exit routines, skip job DSNTIJEX.
- To use the modified sample authorization exit routines, modify DSNTIJEX to reference the correct library before you run it.

If you will use the RACF/DB2 external security module (DSNXRXAC) as your DB2 access control authorization exit routine, modify DSNTIJEX to refer to DSNXRXAC instead of DSNXSXAC.

If job DSNTIJEX runs successfully, it produces return codes of 4.

If job DSNTIJEX fails or abends, correct the problem and rerun the job.

**Related concepts:**

[DB2 data access control \(Managing Security\)](#)

[The default DB2 exit routine \(RACF Access Control Module Guide\)](#)

**Related reference:**

DSNTIPO3: Default startup modules panel

**Related information:**

[Exit routines \(DB2 Administration Guide\)](#)

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## Installation step 8: Record DB2 data to SMF (optional)

When you install DB2, you can specify whether DB2 statistical, accounting, and audit trace data is to be collected.

### Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
To have DB2 collect statistical information	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
To have DB2 collect accounting information	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
To have DB2 collect auditing information	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, DB2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

DB2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. DB2 can also record other performance data. After you complete the installation process, you can use commands to have DB2 record performance data for subsystem events.

2. If, during installation, you requested that DB2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

## What to do next

During DB2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other DB2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:

```
SYS(TYPE(100:102))
```

For DB2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if DB2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for DB2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks:

[Controlling traces \(DB2 Administration Guide\)](#)

### Related reference:

[-START TRACE \(DB2\) \(DB2 Commands\)](#)

[z/OS MVS Initialization and Tuning Guide](#)

### Related information:

[z/OS MVS Initialization and Tuning Reference](#)

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## Installation step 9: Establish subsystem security (optional)

DB2 can control access to data within a DB2 subsystem. DB2 also works with outside security systems, such as RACF, that control access to the DB2 subsystem.

### Before you begin

Your system security administrator should have provided a DB2 for z/OS security environment as outlined in the information about managing DB2 security, including user IDs and resource profiles for batch connections. If you are using RACF, ensure that the system security administrator also defined your DB2 resources to RACF.

The following IDs should have been specified on installation panel DSNTIPP1:

- Two system administrator (installation SYSADM) authorization IDs
- Two system operator (installation SYSOPR) authorization IDs
- Two security administrator (installation SECADM) authorization IDs or roles
- One authorization ID (installation IBMUSER) if RACF is not available for batch access and USER= is not specified in the JOB statement

### Procedure

To establish subsystem security:

- Ensure that the specified installation SYSADM IDs are defined in your TSO and RACF systems before attempting to access DB2. You can also define installation SYSOPR IDs, SECADM IDs, and the installation IBMUSER ID.
- To enable primary and secondary user IDs to issue DB2 commands from the z/OS console or TSO SDSF, define RACF classes to authorize DB2 commands. Use the following RACF commands:

```

SETR CLASSACT(DSNADM)
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)
SETR RACLIST(DSNADM) REFRESH
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)
SETR RACLIST(DSNADM) REFRESH


```

You can grant SYSOPR authority to all primary and secondary user IDs that issue DB2 commands from the z/OS console or TSO SDSF, but only after DB2 can process SQL.

- To separate security tasks from system administration tasks, use the SEPARATE SECURITY field on the DSNTIPP1 panel. Before setting the SEPARATE SECURITY field to YES, set at least one SECADM system parameter to an authorization ID, or create the necessary trusted contexts and roles. If you specify YES for SEPARATE SECURITY, system administrator authority cannot be used to perform security tasks, and the SECADM authority is required to manage trusted contexts and roles. If both SECADM system parameters are set to roles and those roles have not been created, no one will have the authority to manage trusted contexts and roles.
- Run job DSNTIJRA to complete the following tasks:
  - Define the administrative task scheduler started task module to RACF program control
  - Define the administrative task scheduler as a trusted context in RACF

If you are using a DB2 data sharing environment, customize and run DSNTIJRA for each member of the group.

#### Related concepts:

 [Getting started with DB2 security \(Managing Security\)](#)

---

## Installation step 10: Connect DB2 to TSO

Although you can eventually connect DB2 to IMS, CICS, or both, connecting initially only to TSO is recommended for a first-time installation.

### About this task

For a first-time installation, you can run the sample applications that do not require CICS or IMS, allowing your database and system administrators to gain familiarity with the administrative facilities of this version of DB2.

If you have previously installed DB2 and are performing that task again, your database and system administrators are probably already familiar with DB2. In this case, you can connect IMS, CICS, or both, at the same time that you connect TSO. You can then run the sample applications that require CICS and IMS at the same time that you run the sample applications for TSO and batch.

### Procedure

To attach DB2 to TSO:

1. Make DB2 load modules available to TSO and batch users.

2. Make DB2 CLISTs available to TSO and batch users.
3. Make PL/I options available (if applicable).
4. Make panels, messages, and load modules available to ISPF and TSO.
5. Connect the DB2I panels to the ISPF Main Panel.

## Make DB2 load modules available to TSO and batch users

As part of installation, you must make DB2 load modules available to TSO and batch users. If *prefix.SDSNEXIT* and *prefix.SDSNLOAD* are not included in your *LNKLSTxx*, you can skip this step.

### Procedure

To make DB2 load modules available to TSO and batch users:

If you have not included *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in your *LNKLSTxx*, you must add STEPLIB statements to your logon procedures and to the JCL for jobs to ensure that you access the DB2 10 load modules. If *prefix.SDSNEXIT* is not in your *LINKxx*, add it to your STEPLIB and JOBLIB concatenations before *prefix.SDSNLOAD*.

#### Related tasks:

Choosing link list options

## Make DB2 CLISTs available to TSO and batch users (DSNTIJVC)

To connect DB2 to TSO, you must make DB2 CLISTs available to TSO and batch users by running the DSNTIJVC job.

### About this task

From *prefix.SDSNCLST*, the CLIST reads and edits these four CLISTs: DSNEMC01, DSNH, DSNU, and DSNHC. It then places those CLISTs in *prefix.NEW.SDSNTEMP*. You might want to modify the default values. The DSNEMC01 CLIST provides installation default values for the DB2I Default panels (option D on panel DSNEPRI). The first time that a TSO user executes DB2I on a specific ISPF application such as DSNE (NEWAPPL), the DSNEMC01 CLIST sets the defaults based on the values that are specified on installation panel DSNTIPF. DSNEMC01 stores the values in the ISPF profile member DSNEPROF.

Job DSNTIJVC merges the tailored CLISTs from *prefix.NEW.SDSNTEMP* with unchanged CLISTs and REXX execs from *prefix.SDSNCLST*. Then job DSNTIJVC places all CLISTs and REXX execs in *prefix.NEW.SDSNCLST*. It also converts the record format of the DB2 CLISTs from fixed-block to variable-block format with a record length of 84 and a block size of 3120. A CLIST that has been converted from fixed-block to variable-block format cannot be used as input to the DSNTINST CLIST; use the unedited version of the SDSNCLST data set, as created by SMP/E.

### Procedure

To make the CLISTs available to TSO and batch users:

1. If you use fixed-block format for your CLIST libraries, modify job DSNTIJVC as follows:
  - Change the SYSIN DD statement to DUMMY.

- Change the allocation of *prefix*.NEW.SDSNCLST to match the data control block (DCB) attributes of your other CLIST libraries.
2. Run job DSNTIJVC.
  3. Either concatenate *prefix*.NEW.SDSNCLST with your existing CLIST libraries or copy *prefix*.NEW.SDSNCLST into an existing CLIST library.

## What to do next

If you need to rerun job DSNTIJVC, first delete data set *prefix*.NEW.SDSNCLST, which is created by this job.

When corrective service is applied to a CLIST, SMP/E changes only the *prefix*.SDSNCLST data set. You need to redo any record format changes and reapply any special tailoring that is required. You also need to move the CLIST to *prefix*.NEW.SDSNCLST. Corrective service (program temporary fixes) for these CLISTs is sent with ++HOLD statements, calling to your attention the possibility of additional work.

### Related tasks:

Completing the CLIST processing

## Ensure that PL/I options are available

If you are using PL/I, ensure that the options that your DB2 programmers use are included in the compiler.

### Procedure

To ensure that PL/I options are included in the compiler:

1. Ensure that the following options that are used by the program preparation function are available:

FLAG    OBJECT    SOURCE    TERMINAL    XREF

Restrictions that are imposed by your site on PL/I compiler options affect how you can use DB2 program preparation.

2. If the macro pass is used, ensure that the following options are also available:

MACRO    MDECK    SYNTAX

## Make DB2I panels, messages, and load modules available to ISPF and TSO

During installation, to connect the DB2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

### About this task

DB2I uses the ISPF PROFILE and SHARED variable pools for most panel variable fields. As a result, you can easily re-enter a panel when panel variables have previously been specified. For the DB2 subcommands that permit lists of plan names, package names, DBRMs, and ENABLE and DISABLE statements, DB2I provides ISPF to contain all the user-specified variables for these subcommand keywords.

DB2I creates and maintains a set of ISPF tables in a user-defined TSO data set that is allocated to a data set with a ddname of DSNETBLS. The DB2I-generated tables



in this library are DSNCONNS, DSNDBRMS, and DSNPLPKN. The following table shows the library table member names and their contents.

*Table 65. The DB2 ISPF table library*

DSNCONNS	ENABLE or DISABLE connection type and connection name variables that are referenced by plan or package name
DSNDBRMS	Subcommand DBRM member and LIBRARY name variables that are referenced by plan name
DSNPLPKN	Package list variables that are referenced by package name
DSNPATHS	Schema name variables that are referenced by plan or package name and that are to be included in the PATH keyword

DB2I uses ISPF table services to maintain individual ISPF tables within the DSNETBLS data set. For performance reasons, ISPF keeps this table library in an open state once an individual table has been updated. Attempts to close this data set by using the TSO FREE command results in error message IKJ56861I.

## Procedure

To make panels, messages, and load modules available to ISPF and TSO:

1. If you added the DB2I libraries as part of the step to prepare for running the DB2 installation CLIST, you can skip this step. Otherwise, concatenate the DB2 ISPF libraries with the ISPPLIB, ISPTLIB, ISPSLIB, and ISPMLIB DD statements in your logon procedures. You must also concatenate the DB2 ISPF libraries with these DD statements in any of your CLISTs where the libraries might be allocated. These libraries are *prefix.SDSNSPFP*, *prefix.SDSNSPFM*, *prefix.SDSNSPFS*, and *prefix.SDSNPFPE* or *prefix.SDSNPFPP*. If you use English DB2I panels, concatenate SDSNPFPE to ISPPLIB. If you use Kanji DB2I panels, concatenate SDSNPFPP instead of SDSNPFPE.

```

PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE

```

2. Create the DSNETBLS data set.

When allocating this data set, you should assign the following DCB attributes, where *n* is any integer:

```
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE(n*LRECL)
```

The following example shows how to set up an ALLOCATE statement to create the data set:

```

ALLOC DA(DSNSPFT) NEW SP(1 1) TR DIR(10) +
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE(800)
F(DSNETBLS) REUSE

```

The following example shows how to allocate an existing data set to the data set with the DSNETBLS ddname:

```
ALLOC DA(DSNSPFT) F(DSNETBLS) REUSE
```

3. If you want to run the ISPF/CAF sample application that is provided with DB2, ensure that the data set *prefix.RUNLIB.LOAD* is included in the logon procedures or in the ISPLLIB concatenation. If you chose IBMCOB for your LANGUAGE DEFAULT on panel DSNTIPF, you should also include the data set *prefix.CEE.SCEERUN*.

| **Related concepts:**

| Dynamic SQL and the ISPF/CAF application

| **Related reference:**

|  [z/OS ISPF Messages and Codes](#)

## Connect DB2I panels to the ISPF main panel

| You can connect the DB2I panels to the standard ISPF panels that are already  
| installed on your system.

### About this task

| **Recommendation:** Use the following panels for establishing the connection. See  
| your TSO administrator for other possibilities.

- Use panel ISP@MSTR, ISR@PRIM, or ISRFPA for the connection to DB2 Interactive services.
- Use panel ISR00003 for the tutorial menu update.

| Two example panels are provided. Their names are DSN8ISPM (the DB2 version of  
| an ISPF primary options panel) and DSN8ISPT (the DB2 version of a tutorial table  
| of contents).

| If the DB2 panel library is concatenated before the standard ISPF library, the  
| connection is made.

### Procedure

| To connect DB2I panels to the ISPF main panel:

1. Using the TSO RENAME command, give DSN8ISPM an alias of ISR@PRIM, and give DSN8ISPT an alias of ISR00003. For example:  

```
RENAME 'prefix.SDSNSPFP(DSN8ISPM)' (ISR@PRIM) ALIAS  
RENAME 'prefix.SDSNSPFP(DSN8ISPT)' (ISR00003) ALIAS
```
2. Modify the panels as shown in the following examples. If your site has made changes to either of these panels, change your existing panels rather than using the examples.

## Examples

```

)ATTR
/*****
/* COPYRIGHT = 5740-XYR (C) COPYRIGHT IBM CORP 1982, 1985, 1990, 2003 */
/* REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083 */
/* STATUS = VERSION 8, LEVEL 0 */
/*****
)BODY
%----- ISPF/PDF PRIMARY OPTION MENU -----
%OPTION ==>_ZCMD                                +USERID - &ZUSER .
% 0 +ISPF_PARMS - Specify terminal and user parameters +TIME - &ZTIME .
% 1 +BROWSE - Display source data or output listings +TERMINAL - &ZTERM .
% 2 +EDIT - Create or change source data +PF KEYS - &ZKEYS .
% 3 +UTILITIES - Perform utility functions
% 4 +FOREGROUND - Invoke language processors in foreground
% 5 +BATCH - Submit job for language processing
% 6 +COMMAND - Enter TSO command or CLIST
% 7 +DIALOG TEST - Perform dialog testing
% 8 +DB2I - Perform DATABASE 2 Interactive functions
% C +CHANGES - Display summary of changes for this release
% T +TUTORIAL - Display information about ISPF/PDF
% X +EXIT - Terminate ISPF using log and list defaults
%
+Enter%END+command to terminate ISPF.
%
)INIT
.HELP = ISR00003
&ZPRIM = YES /* ALWAYS A PRIMARY OPTION MENU */
&ZHTOP = ISR00003 /* TUTORIAL TABLE OF CONTENTS */
&ZHINDEX = ISR91000 /* TUTORIAL INDEX - 1ST PAGE */
)PROC
&ZSEL = TRANS( TRUNC (&ZCMD'.')
0,'PANEL(ISPOPTA)'
1,'PGM(ISRBRO)'
2,'PGM(ISREDIT)'
3,'PANEL(ISRUTIL)'
4,'PANEL(ISRFPA)'
5,'PGM(ISRJB1) PARM(ISRJPA) NOCHECK'
6,'PGM(ISRPTC)'
7,'PGM(ISPYXDR) PARM(&ZTAPPLID) SCRNAME(DTEST) NOCHECK'
8,'CMD(DSNECPRI) NEWAPPL(DSNE)'
C,'PGM(ISPTUTOR) PARM(ISR00005)'
T,'PGM(ISPTUTOR) PARM(ISR00000)'
',',
X,'EXIT'
*,'?')
&ZTRAIL = .TRAIL
)END

```

Figure 72. ISPF primary option panel (DSN8ISPM), edited to include DB2I

The figure above shows panel DSN8ISPM. Notice the added lines in boldface type. Adding these lines allows you to invoke the DB2 Interactive (DB2I) functions. The added lines include one displayed line:

```
% 8 +DB2I - Perform DATABASE 2 Interactive functions
```

You can also choose to add one of these undisplayed lines:

```
8,'CMD(DSNECPRI) NEWAPPL(DSNE) '
8,'CMD(DSNECPRI SSID(XXXX)) NEWAPPL(DSNE) '
```

The displayed line lets the user choose DB2I. Both of the undisplayed lines invoke the DB2I main panel (DSNEPRI). If you use the first undisplayed line, you accept

the default for the subsystem identifier (SSID) parameter. If you use the second undisplayed lines, you can specify a different SSID parameter.

DSNECPRI is a CLIST and can be invoked directly from another user CLIST. It is an alternative way to invoke DSNEPRI without updating the primary ISPF panel.

By specifying NEWAPPL(DSNE), you define DSNE as the ISPF application that DB2I uses. ISPF uses the name DSNE to create the ISPF profile pool member name (DSNEPROF) in the TSO\_userid.ISPPROF data set, which contains all ISPF panel variables defined during DB2I execution. Any customized DSNEPROF members can be migrated from DB2 10.

**Recommendation:** Examine any new or changed default panel values to ensure that your custom values are still valid, specifically the option values for the subcommands BIND PLAN, REBIND PLAN, BIND PACKAGE, and REBIND PACKAGE.

**Using a NEWAPPL name other than DSNE:** You can define any valid ISPF application name.

```

)ATTR
/*****
/* COPYRIGHT = 5740-XYR (C) COPYRIGHT IBM CORP 1982, 1985, 1990, 2003 */
/* REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083 */
/* STATUS = VERSION 8, LEVEL 0 */
/*****
)BODY
%TUTORIAL ----- TABLE OF CONTENTS ----- TUTORIAL
%OPTION ==>_ZCMD

```

```

-----
| ISPF PROGRAM DEVELOPMENT FACILITY TUTORIAL |
| TABLE OF CONTENTS |
-----

```

The following topics are presented in sequence, or can be selected by entering a one-character selection code in the option field on line 2:

- %G+ GENERAL - General information about ISPF
- %0+ ISPF PARMS - Specify terminal and user parameters
- %1+ BROWSE - Display source data or output listings
- %2+ EDIT - Create or change source data
- %3+ UTILITIES - Perform utility functions
- %4+ FOREGROUND - Invoke language processors in foreground
- %5+ BATCH - Submit job for language processing
- %6+ COMMAND - Enter TSO command or CLIST
- %7+ DIALOG TEST - Perform dialog testing
- %8+ DB2 - Information about DB2**
- %X+ EXIT - Terminate ISPF using log and list defaults

The following topics are presented only if explicitly selected:

- %A+ APPENDIX A - Dynamic allocation interface routine (DAIR) errors
- %B+ APPENDIX B - ISPF listing formats
- %I+ INDEX - Alphabetic index of tutorial topics

```

)PROC
&ZSEL = TRANS(&ZCMD
            G,ISR01000
            0,ISP05000
            1,ISR10000
            2,ISR20000
            3,ISR30000
            4,ISR40000
            5,ISR50000
            6,ISR60010
            7,ISR70000
            8,DSN4V2DB
            X,ISP90100
            A,*ISP93030
            B,*ISR95000
            I,*ISR91000
            )
)END

```

Figure 73. ISPF program development facility tutorial panel (DSN8ISPT), edited to include DB2 tutorial

The figure above shows panel DSN8ISPT. Notice the two added lines in boldface type. Adding these lines allows you to invoke the DB2 tutorial panels. One of the two added lines is displayed:

```
%8+ DB2 - Information about DB2
```


The other added line is undisplayed:

```
8,DSN4V2DB
```

The displayed line presents the user with a choice for the DB2 tutorial. The undisplayed line actually invokes the DB2 tutorial menu (DSN4V2DB).

**Related reference:**

 [z/OS ISPF Dialog Developer's Guide and Reference](#)

 [ISPF User's Guide Vol I](#)

---

## Installation step 11: Connect DB2 to IMS (optional)

Connecting DB2 to IMS is an optional part of installation. Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. Make DB2 load modules available to IMS.
2. Define DB2 to IMS.
3. Define new programs and transactions to IMS.
4. Prepare IMS applications for DB2.
5. Depending on your site, you might also need to:
  - Define DB2 plans for IMS applications.
  - Generate a user language interface.

### Related tasks:

Connecting the IMS attachment facility

---

## Installation step 12: Connect CICS to DB2 (optional)

To connect DB2 to CICS, you need to disconnect and connect the CICS region.

### About this task

Coordinate this connection with your CICS support group.

### Related tasks:

 [Defining the CICS DB2 connection](#)

---

## Installation step 13: Define DB2 to z/OS

After you run job DSNTIJMV to define DB2 in SYS1.PARMLIB, you must activate the definition in z/OS.

### About this task

Job DSNTIJMV makes the following changes to the SYS1.PARMLIB library:

- Creates new subsystem definitions in the IEFSSNxx member
- Creates new APF libraries in the IEAAPFxx member
- Creates new load module libraries in the LNKLSTxx member

The load module library SDSNLINK contains the early code. SDSNLINK contains modules that must be placed in the link list look-aside address space (LLA) because they are loaded at subsystem initialization during the IPL.

### Procedure

To define DB2 to z/OS:

IPL z/OS.

During the z/OS IPL, message DSN3100I appears on the z/OS console, stating that DB2 is ready for the START command.

Alternatively, to define DB2 to z/OS until the next IPL, you can use the SETSSI, SETPROG APF, and SETPROG LNKLST commands.

**Related tasks:**

Installation step 2: Define DB2 to z/OS: DSNTIJMV

**Related reference:**

 z/OS SETPROG Command (MVS System Commands)

 z/OS SETSSI Command (MVS System Commands)

---

## Installation step 14: Start the DB2 subsystem

During installation of DB2, start the DB2 subsystem after you IPL z/OS.

### Procedure

To start DB2:

1. Start the IRLM, if you have not requested that DB2 automatically start the IRLM. You must start IRLM before you start DB2.

Use the following command:

```
START irlmproc
```

where *irlmproc* is the name that you specified for the PROC NAME option on IRLM Panel 1 (DSNTIPI).

If you specified YES for the AUTO START option on IRLM Panel 1 (DSNTIPI), DB2 starts the IRLM automatically.

2. Start DB2 from the z/OS console. The simplest form of the following command is:

```
-DSN1 START DB2
```

where *-DSN1* is the subsystem command prefix that you defined for DB2.

When you issue the START DB2 command with this command format, DB2 uses the subsystem parameter module that is specified in the *ssnmMSTR* start-up JCL procedure in SYS1.PROCLIB.

If you need to change the name of the subsystem parameter module, you can edit the *ssnmMSTR* JCL member in SYS1.PROCLIB. Alternatively, you can override the default subsystem parameter module name by using the PARM option, as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSN3100I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, possibly *ssnmDIST*, possibly *ssnmADMT*, and *irlmproc*, where *ssnm* is the DB2 subsystem name, *ssnmADMT* is the DB2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

When you start DB2 10 for the first time, DB2 issues message DSNT501I with reason code 00C900A6. This message is expected. When you run job DSNTIJTC, which is required to complete the tailoring of the DB2 catalog, the cause of this message is corrected. Job DSNTIJTC is described in a later installation step.

After you start DB2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If DB2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIE, DSNTIJIF, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started DB2 is the one that is built by job DSNTIJUZ. Check the JCL for the DB2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

3. Optional: Start TSO. After DB2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

---

## Installation step 15: Tailor the DB2 catalog: DSNTIJTC

Job DSNTIJTC invokes the CATMAINT utility to tailor your DB2 10 catalog, which you must do to fully install DB2. DSNTIJTC performs site-specific tailoring of the catalog.

### Before you begin

To execute DSNTIJTC, you must have the installation SYSADM authority. Also, SMS must be active on the system where this DB2 subsystem is being installed. SMS must be configured to allocate all data sets for the DB2 catalog and directory in extended format and to use extended addressability.

### About this task

**Important:** In a data sharing environment, do not run DSNTIJTC after installing non-originating members.

### Procedure

To tailor the DB2 catalog:

Run job DSNTIJTC. You must ensure that the installation job runs on the same z/OS system on which the appropriate DB2 subsystem is running. A status message, DSNU777I, is issued at several points to indicate progress. Diagnostic error messages are issued when CATMAINT processing fails. If a problem is found during the SQL processing phase of installation, message DSNU778I is issued. If non-supported functions are encountered, message



DSNU776I is issued. All of these messages are written to the SYSPRINT data set. Because this is the first use of DB2, errors from earlier steps might be detected here.

## Results

If you receive abend reason code 00C200EF, the catalog and directory data sets are not in a compliant SMS environment.


If you receive an abend reason code from the data manager (X'00C9'xxx) or buffer manager (X'00C2'xxx), carefully recheck jobs DSNTIJIN, DSNTIJID, DSNTIJIE, and DSNTIJIF.


### Related reference:


DSNTIPY: Job editing panel

 [CATMAINT \(DB2 Utilities\)](#)

### Related information:

 [DSNU776I \(DB2 Messages\)](#)

 [DSNU777I \(DB2 Messages\)](#)

 [DSNU778I \(DB2 Messages\)](#)

---

## Installation step 16: Create default storage group, define temporary work files, and bind DB2 REXX Language Support: DSNTIJTM

You must create the default storage group that is for user-defined DB2 tables that are not specifically assigned to a storage group. You must also define the database that is for temporary work files, and bind DB2 REXX Language Support.

### Procedure

To create the default storage group, define temporary work files, and bind DB2 REXX Language Support:

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

*Table 66. DSNTIJTM return codes*

Step	PROCSTEP	Return code
DSNTIAD	PC	0000
	ASM	0000
	LKED	0000
DSNTIAB	(none)	0000
DSNTIAS	(none)	0000
DSNTICR	(none)	0000
DSNTIRX	(none)	0000
DSNTIST	(none)	0000

## Results

DSNTIJTM assembles, link-edits, binds, and runs DSNTIAD, a program that processes certain SQL statements dynamically. It also defines the initial buffer pool sizes that are specified on installation panels DSNTIP1 and DSNTIP2. When you use the ENABLE or MEMBER functions, the steps to prepare and bind the DSNTIAD program are unnecessary and are removed during editing.

DSNTIJTM also provides some cleanup to ease reruns.

The SYSDEFLT storage group is the default storage group, and it is used for your database, table space, and table definitions that are not related to a specific storage group. By default, it is also used for the work file database and for work file table spaces that are created during DB2 installation and migration. When DSNTIJTM creates the SYSDEFLT storage group, it completes the following grants:

- Grants use of the default buffer pool and storage group to PUBLIC.
- Grants use of the SYSDEFLT table space. This table space does not really exist, but this GRANT statement is necessary to give users the ability to implicitly create table spaces in the default database.
- Grants authority to create tables and table spaces in the default database to PUBLIC.

## What to do next

For non-data-sharing installations, the work file database name is DSNDB07. For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve DB2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table spaces after you run job DSNTIJTM, use the DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

### Related concepts:

Work file database storage requirements

---

## Installation step 17: Define and bind DB2 objects: DSNTIJSJ

Use job DSNTIJSJ to bind DB2-supplied packages and plans, initialize the DB2 communications database, and create user-managed databases for the DB2 resource limit facility (RLF) and Data Definition Control support.

## Before you begin

**Important:** In a data sharing environment, you must ensure that the resource limit facility (RLF) is inactive on all members in the data sharing group before running DSNTIJSJG. To do this, issue the STOP RLIMIT command for each member.

## Procedure

To use job DSNTIJSJG:

1. If you use a product that uses a semicolon as a delimiter, replace the semicolons at the end of each SQL statement in job DSNTIJSJG before you run the job.

If you use a product that uses a semicolon as a delimiter, the CLIST adds SQL statements to job DSNTIJSJG. Products that use a semicolon as a delimiting character cause semicolons to be removed from the installation CLIST before it is executed.

2. Run job DSNTIJSJG.

If the DSNTIJSJG job runs successfully, it produces return codes of 0. It might also produce a return code of 4 because a step within this job attempts to delete a row from a table that might not exist at the time that this job runs. Expect the following messages from the BIND statement for each object that DB2 provides:

```
DSNE932I  WARNING, ONLY IBM-SUPPLIED PLAN NAMES SHOULD BEGIN WITH DSN
```

```
DSNE932I  WARNING, ONLY IBM-SUPPLIED PACKAGE-IDS SHOULD BEGIN WITH DSN
```

```
DSNE932I  WARNING, ONLY IBM-SUPPLIED COLLECTION-IDS SHOULD BEGIN WITH DSN
```

3. If the DSNTIJSJG job fails or abends:


- a. Be sure that the user that is specified on the JOB statement is authorized. Use the same name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.
- b. Correct any other problems with the DSNTIJSJG job, and run it again. If you do not have enough resources to run the job, review the values that you specified for the DB2 installation parameters. (See job DSNTIJUZ.) Use the standard update procedure to make any necessary modifications. Then stop DB2, run the DSNTIJUZ job, start DB2, and run the DSNTIJSJG job again.


## What to do next

During the ISPF tailoring session, you named one or two IDs to have installation SYSADM authority. One of these users can now grant various levels of authority to other users. You can use SPUFI or a job similar to DSNTIJSJG to perform the authorization. To grant SYSOPR authority to all primary and secondary user IDs that issue DB2 commands from the z/OS console or TSO SDSF, issue the following statement in SPUFI:

```
GRANT SYSOPR TO userid
```

### Related concepts:

 [Data definition control support database \(Introduction to DB2 for z/OS\)](#)

 [The resource limit facility \(Introduction to DB2 for z/OS\)](#)

### Related tasks:

[Populating the communications database for use with TCP/IP](#)

[Special packages and plans for SPUFI](#)

[Updating subsystem parameter and application default values](#)

Verifying that installation or migration was successful with the sample applications

**Related reference:**

DSNTIP5: Distributed data facility panel 2

**Related information:**

## Job DSNTIJSJG

During installation, job DSNTIJSJG binds DB2-supplied packages and plans.

When you run job DSNTIJSJG during installation, it binds DB2 plans, including the plans for SPUFI and DCLGEN. DSNTIJSJG also binds a package for a message routine that is used by SPUFI and DCLGEN, and binds that package into the plans for SPUFI and DCLGEN. If you use SPUFI to access remote sites, you might need to bind different packages and plans for SPUFI. You also might need to bind different packages and plans for SPUFI if some users need to run SPUFI under different terminal CCSIDs.

Job DSNTIJSJG also binds the package and plan for the DSNTXAZP program, which updates a specified CLIST defaults input member (DSNTIDxx) with the current subsystem parameter and buffer pool settings that are defined in the subsystem.

The DSNTIJSJG job also completes the following tasks for user-maintained database activity:

- Creates the resource limit facility database.
- Within the resource limit facility database, creates a new resource limit facility table, DSNRLMTnn, and a new resource limit facility index, DSNMRLnn. By default, the step that creates this new table and index is commented out in the JCL. To have DB2 create DSNRLMTnn and DSNMRLnn, uncomment the step.
- Creates the data definition control support database.

The DSNTIJSJG job inserts a blank row into the communication database (CDB) table SYSIBM.LUNAME. The CDB holds tables that contain information about your connection with remote DB2 subsystems, and a blank row allows all SNA clients to access DDF. TCP/IP remote clients cannot be controlled by using the CDB. If you run DSNTIJSJG again, SQLCODE -803 is issued after an INSERT request because the blank row already exists.

The TCP/IP ALREADY VERIFIED field of panel DSNTIP5 defines the minimum security requirements for all TCP/IP clients because inbound security requirements cannot be established on individual clients.

---

## Installation step 18: Populate the user-maintained databases (optional)

Job DSNTIJSJG creates user-maintained databases that you might need to populate.

### Procedure

Populate the user-maintained databases, including the resource limit specification table, and the data definition control support tables. Although DB2 automatically creates the user-maintained databases, you must complete this step if you plan to use data definition control or the resource limit facility (RLF).

---

## Installation step 19: Configure DB2 for running stored procedures and user-defined functions


Before you can use user-defined functions or the following types of stored procedures, you need to perform some set-up tasks:

- External stored procedures
- External SQL procedures
- Native SQL procedures that satisfy at least one of the following conditions:
  - The native SQL procedure calls at least one external stored procedure, external SQL procedure, or user-defined function.
  - The native SQL procedure is defined with `ALLOW DEBUG MODE` or `DISALLOW DEBUG MODE`.
- DB2-supplied stored procedures


All routines, except native SQL procedures, must run in an environment that is established by the z/OS Workload Manager (WLM). A set of DB2-supplied routines are installed by job DSNTIJRT and validated by job DSNTIJRV as part of the installation process. You can also define your own routines or use routines that are provided by a non-IBM vendor. Before you can use any stored procedures and user-defined functions, however, you need to set up WLM environments for these routines. If you plan to use certain DB2-supplied stored procedures or user-defined functions, you need to perform some additional steps.

### Related concepts:

 [Stored procedures \(DB2 Application programming and SQL\)](#)

 [User-defined functions \(DB2 SQL\)](#)

### Related tasks:

 [Installing the IBM Data Server Driver for JDBC and SQLJ on Db2<sup>®</sup> for z/OS \(DB2 Application Programming for Java\)](#)

## Tailoring DB2 subsystem parameters for stored procedures during installation (optional)

Several subsystem parameters should be tailored to your DB2 environment before you use stored procedures. These parameters were set when you installed or migrated DB2. If you are satisfied with those values, you do not need to complete this step.

### About this task

The subsystem parameters for stored procedures are:

- `MAX_NUM_CUR`
- `MAX_ST_PROC`
- `STORMXAB`
- `STORTIME`

### Procedure

To modify the values of these subsystem parameters, complete one of the following tasks:

- Run the installation CLIST again in INSTALL or MIGRATE mode. On the installation panels, leave most of the existing values and change the following fields on their respective panels:
  1. On panel DSNTIPA1, specify the input member that contains field values for your current installation.
  2. On panel DSNTIPT, specify different names for the TEMP CLIST LIBRARY and SAMPLE LIBRARY fields to avoid overwriting your original libraries.
  3. On panel DSNTIPX, add or change the values of the MAX ABEND COUNT, TIMEOUT VALUE, MAX OPEN CURSORS, and MAX STORED PROCS fields as appropriate.
  4. On panel DSNTIPY, specify a name for the REMOTE LOCATION field. DB2 uses this name for the stored procedure sample applications.
- Edit job DSNTIJUZ to add or change values for the subsystem parameters for routines.
 

This method has the following disadvantages:

  - DB2 does not use these new values for any future migrations because your DSNTIDxx member and DSNTIJUZ parameters are not saved for future input.
  - DB2 does not generate the sample jobs for stored procedure and user-defined functions because you are not running the DSNTINST CLIST.

**Related reference:**

DSNTIPA1: Main panel

DSNTIPT: Data set names panel 1

DSNTIPX: Routine parameters panel

DSNTIPY: Job editing panel

Directory of subsystem parameters, panel fields, and application default values

## Setting up Language Environment for stored procedures during installation

*Language Environment* (LE) is a component of the z/OS operating system that establishes a common runtime environment for all applications, regardless of programming language. DB2 uses Language Environment to provide a runtime environment for external stored procedures and external SQL procedures.

### About this task

Language Environment provides a set of essential run time services that are available through a set of interfaces that are consistent across programming languages. These services include routines for run time message handling, condition handling, and storage management.

Language Environment provides the following advantages for DB2 stored procedures:

- Language Environment hides the differences between programming languages.
- Language Environment provides the ability to make a stored procedure resident in the stored procedure address spaces.
- Language Environment supports a large number of run time options, including those options that are needed to use tools to debug your stored procedures.

### Procedure

To set up Language Environment for stored procedures:

1. Customize Language Environment by completing the instructions in z/OS Language Environment Customization.
2. Specify the Language Environment run time library in the JCL startup procedure for each WLM-managed address space for stored procedures. This library must be the only available run time library. Do not reference any other language run time libraries within the system link list or within the STEPLIB statements. If other language run time libraries are defined in the system link list, use STEPLIB statement overrides to exclude them.

Multiple languages can share the same Language Environment run time library. Therefore, you do not need to specify the language-specific libraries in the JCL startup procedure of each stored procedure address space.

**Restriction:** Do not use compilers (or associated run time libraries) that are no longer supported by IBM.

## What to do next

After you set up Language Environment for stored procedures, you can override the Language Environment run time options for individual stored procedures. You can do this by using the RUN OPTIONS clause in the CREATE PROCEDURE statement or ALTER PROCEDURE statement. The default values for Language Environment run time options are defined by z/OS. You might have overridden some of these default values when you customized Language Environment.

### Related concepts:

- External stored procedures (DB2 Application programming and SQL)
- SQL procedures (DB2 Application programming and SQL)
- Language Environment setup (DB2 for z/OS Stored Procedures: Through the CALL and beyond)

### Related reference:

- CREATE PROCEDURE (external) (DB2 SQL)
- CREATE PROCEDURE (SQL - external) (DB2 SQL)
- Customizing Language Environment run-time options (z/OS Language Environment Customization)

## Implementing RRS for stored procedures during installation

To use some DB2 stored procedures, you must implement Resource Recovery Services (RRS). RRS is a sync point manager program that coordinates two-phase commit processing. DB2 requires that RRS be active because WLM-managed stored procedure address spaces use the RRS attachment facility (RRSAF).

### About this task

RRS records events for protected resources in log streams that are managed by a z/OS component called the system logger. The following table identifies the log streams that RRS uses, where *gname* can be your Sysplex name or any name in a non-Sysplex environment:

Table 67. Log streams that RRS uses

Log stream type	Log stream name	Content
Main unit-of-recovery log state stream	ATR.gname.MAIN.UR	The state of active units of recover (URs). RRS periodically moves this information into the RRS delayed UR state log when UR completion is delayed.
Delayed unit-of-recovery log state stream	ATR.gname.DELAYED.UR	The state of active URs, when UR completion is delayed.
Resource manager data log stream	ATR.gname.RM.DATA	Information about the resource managers that use RRS services.
Restart log stream	ATR.gname.RESTART	Information, which is needed during restart, about incomplete URs. This information enables a functioning RRS instance to assume remaining incomplete work from an RRS instance that failed.
Archive log stream	ATR.gname.ARCHIVE	Information about completed URs. This log stream is optional, but recommended.

All of these log streams are required except for the archive log stream. RRS does not start if it is not able to connect to the required log streams.

In a Sysplex environment, these log streams are shared by the systems of the Sysplex.

## Procedure

To implement RRS for stored procedures:

1. Define the RRS log streams that are to be written, either on disk or in the coupling facility by completing the following actions:
  - a. If you are using the coupling facility, add definitions for the RRS structures in the CFRM policy.

When you are use coupling facility log streams, each log stream needs to be mapped to a coupling facility structure.

**Example:** The following example shows JCL that updates the CFRM policy to add the RRS structures:

```
//DEFRCFRM1 JOB MSGCLASS=X,TIME=10,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//SYSIN DD *
        DATA TYPE(CFRM) REPORT(YES)
        DEFINE POLICY NAME(CFRM18) REPLACE(YES)
        CF NAME(CF01)
           TYPE(009672)
           MFG(IBM)
           PLANT(02)
           SEQUENCE(000000040104)
```



```

PARTITION(1)
CPCID(00)
DUMPSPACE(2048)
CF NAME(CF02)
TYPE(009672)
MFG(IBM)
PLANT(02)
.....
.....
.....
STRUCTURE NAME(RRS_ARCHIVE_1)
    INITSIZE(8000)
    SIZE(16000)
    PREFLIST(CF1,CF2)
    REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RMDATA_1)
    INITSIZE(8000)
    SIZE(16000)
    PREFLIST(CF1,CF2)
    REBUILDPERCENT(5)
STRUCTURE NAME(RRS_MAINUR_1)
    INITSIZE(8000)
    SIZE(16000)
    PREFLIST(CF1,CF2)
    REBUILDPERCENT(5)
STRUCTURE NAME(RRS_DELAYEDUR_1)
    INITSIZE(8000)
    SIZE(16000)
    PREFLIST(CF1,CF2)
    REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RESTART_1)
    INITSIZE(8000)
    SIZE(16000)
    PREFLIST(CF1,CF2)
    REBUILDPERCENT(5)

```

- b. Define the log streams in the system logger policy by using the IXCMIAPU utility. This utility program is provided in the SYS1.MIGLIB system library. If you are using the coupling facility, also define the structures in the system logger policy. You can map each log stream to a single structure or you can map log streams of like data types to the same structure.

**Example of defining coupling facility log streams:** The following example JCL shows definitions for coupling facility structures and RRS log streams. In this case, each RRS log stream is mapped to a structure.

```

//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(LOGR) REPORT(YES)

DEFINE STRUCTURE NAME(RRS_ARCHIVE_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(262)

DEFINE STRUCTURE NAME(RRS_RMDATA_1) LOGSNUM(1)
    MAXBUFSIZE(1024) AVGBUFSIZE(252)

DEFINE STRUCTURE NAME(RRS_MAINUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

DEFINE STRUCTURE NAME(RRS_DELAYEDUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

DEFINE STRUCTURE NAME(RRS_RESTART_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

```

```

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.ARCHIVE) STRUCTNAME(RRS_ARCHIVE_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RM.DATA) STRUCTNAME(RRS_RMDATA_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.MAIN.UR) STRUCTNAME(RRS_MAINUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.DELAYED.UR) STRUCTNAME(RRS_DELAYEDUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RESTART) STRUCTNAME(RRS_RESTART_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)
/*

```

**Example of defining disk log streams:** The following example JCL shows definitions for RRS log streams on disk.

```

/DEFSTREXECPGM=IXCMIAPU
//SYSPRINT DDSYSOUT=A
//SYSINDD *
DATA TYPE(LOGR)

DEFINE LOGSTREAM NAME(ATR.PLEX1.MAIN.UR)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(1024)
LS_DATACLAS(VSAMLS)
STG_SIZE(1024)

DEFINE LOGSTREAM NAME(ATR.PLEX1.DELAYED.UR)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(960)
LS_DATACLAS(VSAMLS)
STG_SIZE(960)

DEFINE LOGSTREAM NAME(ATR.PLEX1.ARCHIVE)
LOWOFFLOAD(0)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)

```

```

LS_SIZE(960)
LS_DATACLAS(VSAMLS)
AUTODELETE(YES)
RETPD(2)
STG_SIZE(2000)

```

```

DEFINE LOGSTREAM NAME(ATR.PLEX1.RM.DATA)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(192)
LS_DATACLAS(VSAMLS)
STG_SIZE(192)

```

```

DEFINE LOGSTREAM NAME(ATR.PLEX1.RESTART)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(960)
LS_DATACLAS(VSAMLS)
STG_SIZE(960)

```

- c. If you are using coupling facility log streams, compile and link-edit the changed CFRM policy.
- d. If you are using coupling facility log streams, activate the updated CFRM policy in your Sysplex by using the following operator command:

```
SETXCF START,POLICY,TYPE=CFRM,POLNAME=polname
```

2. Establish the priority for RSS within the WLM policy.

The RRS priority needs to be equal to or higher than the dispatching priority of DB2. You can use the SYSSTC service class for the RRS address space to achieve a higher dispatching priority.

3. Move the ATRRRS procedure that is supplied by IBM from SYS1.SAMPLIB to your SYS1.PROCLIB as member RRS, and make any necessary changes. This JCL procedure is used to start RRS.

You can use a member name other than RRS, but the first four characters of this name must match the subsystem name that you specify in the IEFSSN:xx member of SYS1.PARMLIB in the next step.

The GNAME value in the procedure must match the *gname* that you specified when defining the log streams. The default value for *gname* at RRS startup is the Sysplex name.

**Example:** The following example shows a sample procedure to start RRS.

```

//RRS PROC GNAME=' ',CTMEM=' '
//RRS EXEC PGM=ATRIMIKE,REGION=0M,TIME=NOLIMIT,
// PARM='GNAME=&GNAME CTMEM=&CTMEM'
//

```

4. Define RRS as a subsystem to z/OS by editing the active IEFSSN:xx member of SYS1.PARMLIB to include the following entry:

```
SUBSYS SUBNAME(RRS) /* RESOURCE RECOVERY SERVICES */
```

The subsystem name can be RRS or any other name that you choose. However, the first four characters (or fewer characters if the name is shorter) must match the name of the JCL procedure to start RRS.

5. Start RRS by using the following operator command:

```
START RRS
```

If you subsequently need to stop RRS, use one of the following operator commands:

- SETRRS CANCEL
- SETRRS SHUTDOWN

If neither of these commands stops RRS, use the FORCE RRS,ARM command. In this command, RRS is the subsystem name that your installation assigned to RRS in PARMLIB member IEFSSNxx.

**Related concepts:**

[RRSAF \(DB2 for z/OS Stored Procedures: Through the CALL and beyond\)](#)

**Related reference:**

[z/OS MVS Programming: Resource Recovery](#)

[Configuring and defining RRS logging requirements \(z/OS MVS Programming: Resource Recovery\)](#)

[Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

## Setting up a WLM application environment for stored procedures during installation

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

### About this task

If you use data sharing, see “Special considerations for WLM-managed stored procedures in coexistence” on page 749 for additional guidance about setting up WLM environments.

For DB2-supplied routines, you can use the provided definitions for core WLM environments as a starting point for defining your environments. You can use job DSNTIJRW to define and activate these core environments. For more information on using job DSNTIJRW, see Setting up the DB2 core WLM environments during installation. Job DSNTIJMV adds to SYS1.PROCLIB the startup address space procedures for the core WLM environments.

**Recommendation:** Use partitioned data set extended (PDSE) for load libraries that contain external modules for stored procedures. Using PDSEs might eliminate your need to stop and start the stored procedures address space due to growth of the load libraries. If a load library grows from additions or replacements, the library might need to be extended.

### Procedure

To set up a WLM application environment for one or more stored procedures:

1. Gather requirements for the WLM environment. These requirements include:
  - The name of the DB2 subsystem or data sharing group where the stored procedure or user-defined function is to run.
  - The maximum number of task control blocks (TCBs) that can run concurrently in an address space that is initiated by the WLM environment. This setting, referred to as the NUMTCB, is the maximum number of

procedures or functions that should run concurrently in that WLM-managed address space. The appropriate setting depends on the requirements or limitations of the individual stored procedure or user-defined function.

- For recommended NUMTCB values for DB2-supplied stored procedures, see “Installation information for procedures and functions that are supplied with DB2” on page 877.
  - For recommended NUMTCB values for your own stored procedures, see Assigning stored procedures and functions to WLM application environments (DB2 Performance). If a routine allocates a large amount of memory or if the external module for the routine is not re-entrant, the NUMTCB value should be 1. If there is a need for serialization, the NUMTCB value should also be 1.
  - The WLM environment for a REXX stored procedure must have a NUMTCB setting of 1.
- Requirements for Authorized Program Facility (APF).
    - Stored procedures and user-defined functions that execute privileged instructions (for example, WLM\_REFRESH) must run in a WLM environment that has an APF-authorized address space.
    - DB2 REXX stored procedures, such as DSNTPSMP, and other routines that use TSO/E and REXX facilities must run in a WLM environment that does not have an APF-authorized address space.
    - Most stored procedures can run in a WLM environment that either has or does not have an APF-authorized address space. However, running a routine in an APF-authorized environment is recommended only when doing so is necessary.
  - Special data sets and DD names that are needed by the stored procedure or user-defined function. For example, all Java stored procedures implicitly require a Language Environment run time options data set to be allocated to DD name JAVAENV. Other routines might also have an explicit requirement for a work file to be allocated to a particular DD name.
2. Create a JCL startup procedure for the WLM application environment.

Use *ssnm*WLM (where *ssnm* is the DB2 subsystem ID) as the basis for creating the new startup procedure. *ssnm*WLM is the default name of the sample JCL procedure for starting WLM-established address spaces. If you specified a name in the WLM PROC NAME field on the DSNTIPX installation panel, the sample procedure has that specified name. The sample procedure is placed in your system PROCLIB by installation job DSNTIJMV. For the DSNACICS stored procedure, DSNTIJMV also provides sample procedure *ssnm*CICS, where *ssnm* is the subsystem ID. Tailor your new startup procedure as follows:

- Change the APPLENV value to the name of the WLM application environment that you plan to define.
- Change the startup procedure name to an appropriate procedure name.

**Recommendation:** Specify the same name for the application environment name and the procedure name. Using the same name simplifies monitoring the WLM environment definitions.

- Change the value of DB2SSN to your DB2 subsystem name.
- Ensure that the NUMTCB value is appropriate. If the minimum number of address spaces is specified, the NUMTCB value will be the number of task control blocks that are started in an address space.

**Recommendation:** If you want to be able to easily change the NUMTCB value, specify the NUMTCB value here, and do not specify this parameter on the application environment definition panel when you define the WLM application environment. Specifying NUMTCB on the environment definition panel associates this parameter with the WLM application environment definition. Any changes to the JCL startup procedure can be made by refreshing the WLM application environment. However, changes to the WLM application environment require that you reinstall the z/OS service policy at an LPAR or sysplex level. If you specify the NUMTCB parameter for both the WLM application environment and the startup procedure, the value in the WLM application environment overrides the value in the startup procedure.

- If the environment is one in which the cost of starting new address spaces is very high, you can use the MNSPAS parameter. The MNSPAS parameter specifies the minimum number of address spaces that are to be started and maintained. The value can be 0 through 50. The default value is 0, which means that no minimum number of address spaces is specified. If the number of address spaces is at the specified minimum, cancelling an address space causes WLM to start another one to maintain the minimum. If you refresh a WLM environment, WLM starts a number of new address spaces as needed (or the specified minimum number) and stops the old address spaces.

If the MNSPAS parameter is specified, the NUMTCB value is the number of task control blocks that are started in an address space. If the MNSPAS parameter is not specified, the NUMTCB value is the maximum number of task control blocks that can be started in an address space.

- Edit the data set names to match your data set names.
- Ensure that the library in which the stored procedure resides is in the STEPLIB concatenation.
- Ensure that the IBM Language Environment run time library is specified in the STEPLIB concatenation, unless your system includes the Language Environment run time library in the system link list.
- If you want to run the stored procedure in a WLM environment that has an APF-authorized address space, ensure that all the libraries in the STEPLIB concatenation are defined to the Authorized Program Facility.
- Add any special DD statements that are required for the stored procedures or user-defined functions that are to run in the WLM environment.
  - If you plan to use stored procedures that use the ODBA interface to access IMS databases, make the following additional changes:
    - Add the data set name of the IMS data set that contains the ODBA callable interface code to the end of the STEPLIB concatenation. The name of this data set is usually IMS.RESLIB.
    - After the STEPLIB DD statement, add a DFSRESLB DD statement that names the IMS data set that contains the ODBA callable interface code.
  - If your routines are defined as PROGRAM TYPE SUB and use UNIX System Services (USS) syscall statements, you might need to add a NOUNDUB DD statement. By default, the USS process and its resources are cleaned up after every stored procedure and user-defined function invocation. If you need the task in this WLM environment to retain the process across subsequent invocations, add a dummy NOUNDUB DD statement. This option specifies that no cleanup will occur unless the WLM environment is refreshed. To enable this option, add the following statement to the WLM stored procedure address space startup JCL:

//NOUNDUB DD DUMMY

Use this option with caution because routines use the USS process that was used by the previous routine that was run under the same task. Also note that any open resources such as file descriptors remain open for the next routine that is run under the same task. Consider using this option on new workloads only if reusing the USS process is the desired behavior.

**Example of a startup procedure:** The following example shows a startup procedure for a WLM application environment for external SQL, COBOL, C, C++, PL/I, and assembler stored procedures. This startup procedure for external SQL stored procedures needs one unauthorized data set included in STEPLIB.

```

//*****
//* JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
//* ADDRESS SPACE
//* RGN      -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.
//* DB2SSN  -- THE DB2 SUBSYSTEM NAME.
//* NUMTCB  -- THE NUMBER OF TCBS USED TO PROCESS
//*          END USER REQUESTS.
//* APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT
//*          SUPPORTED BY THIS JCL PROCEDURE.
//*
//*****
//DB9AWLM PROC RGN=0K,APPLENV=WLMENV,DB2SSN=DB9A,NUMTCB=40,MNSPAS=3
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//             PARM=' &DB2SSN,&NUMTCB,&APPLENV,&MNSPAS '
//STEPLIB DD DISP=SHR,DSN=DB9AU.RUNLIB.LOAD
//         DD DISP=SHR,DSN=CEE.SCEERUN
//         DD DISP=SHR,DSN=DB9A9.SDSNEXIT
//         DD DISP=SHR,DSN=DB9A9.SDSNLOAD

```

3. Define the application environment to WLM by using one of the following methods.

- Use the WLM administrative application (IWMARIN0) to define a new environment or copy or modify an existing one.
  - a. In the first WLM panel, Definition Menu, enter 9 for Application Environments.

The application environment definition panel is displayed.
  - b. On the application environment definition panel, specify the appropriate action code:
    - Create a new WLM application environment.
    - Copy an existing WLM application environment.
    - Modify an existing WLM application environment.

The appropriate panel for creating, copying or modifying the application environment is displayed.
  - c. If you are creating or modifying a WLM environment, specify the appropriate options for the WLM application environment definition, using the same application environment name and procedure name that you specified for the startup procedure.
  - d. After you specify the appropriate options, press Enter to create the application environment definition.
- Modify and run sample job DSNTIJRW. As provided, DSNTIJRW creates the core DB2 WLM environments, but you can modify the job to define your own WLM environments. Job DSNTIJMV copies an address space procedure for each of the DB2 core WLM environments into SYS1.PROCLIB.

4. Install the WLM service definition that contains information about the application environment by opening the WLM Definition Menu panel and selecting the **Install** function in the **Utilities** menu bar.
5. Activate the WLM service policy from the installed service definition by completing one of the following actions:
  - Issue the VARY WLM command as follows:
 

```
VARY WLM,POLICY=policy-name
```
  - On the WLM Definition Menu panel, choose the **Activate service policy** option from **Utilities** menu bar.
6. Set up security for the WLM application environments and for creating stored procedures by completing the following actions:
  - a. Optional: Specify which WLM-established address spaces can run stored procedures. If you do not complete this step, any WLM-established address space can run stored procedures.
  - b. Grant access to users to create procedures in specific WLM address spaces.
  - c. Grant access to users to create procedures in specific schemas. Use the GRANT statement with the CREATIN option for the appropriate schema.
  - d. Grant access to users to create packages for procedures in specific collections. Use the GRANT statement with the CREATE option for the appropriate collection.
 

**Requirement:** For native SQL procedures, the collection name for the package must be the same as the schema name.
  - e. Grant access to refresh the WLM environments to the appropriate people.

For more detail, see Managing authorization for stored procedures (Managing Security).
7. Ensure that the ID that is used to run the JCL startup procedure for the WLM application environment has permission to use RRSAF. Each time one of the DB2 WLM address spaces is started, it uses RRSAF to attach to DB2.

## What to do next

When you create or alter a stored procedure, specify the WLM application environment that DB2 is to use in the WLM\_ENVIRONMENT option of the CREATE or ALTER PROCEDURE statement. When you specify environments, be aware that:

- Routines that have low memory requirements and that are frequently called should not share an environment with routines that have high memory requirements and are rarely called. Otherwise, storage is wasted.
- Stored procedures can be grouped according to the authorization settings for a WLM environment.
- WLM environments should not be shared among routines that use the same DD name for different purposes.
- WLM environments should not be shared among routines if one routine allocates data sets in the environment and that routine is run only occasionally. If other routines that do not use the data sets use the environment, the data sets are kept artificially allocated, which might interfere with other tasks.

### Related concepts:

WLM-established stored procedures address spaces storage requirements

### Related tasks:



➞ Setting up and managing Workload Manager (DB2 for z/OS Stored Procedures: Through the CALL and Beyond)

➞ Managing authorization for stored procedures (Managing Security)

➞ Refreshing WLM application environments for stored procedures (DB2 Administration Guide)

**Related reference:**

Core WLM environments for DB2-supplied routines

DSNTWLMB tool

➞ GRANT (collection privileges) (DB2 SQL)

➞ GRANT (schema privileges) (DB2 SQL)

➞ set\_dub\_default (BPX1SDD, BPX4SDD) (z/OS UNIX System Services Programming): Assembler Callable Services Reference

**Related information:**

➞ Using Operator Commands for Application Environments (z/OS MVS Planning: Workload Management)

---

## Installation step 20: Set up DB2-supplied routines

Installation jobs are provided for the setup of all DB2-supplied routines and supporting objects.

### Setting up the DB2 core WLM environments during installation

DB2 stored procedures (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

#### About this task

For DB2-supplied routines, you can use the provided definitions for core WLM environments as a starting point for defining your environments. You can also manually define the WLM environments by using the IWMARIN0 application, as described in Setting up a WLM application environment for stored procedures during installation.

**Exception:** You do not need to complete this configuration task for native SQL procedures unless they call at least one external stored procedure or external SQL procedure. This task also applies to native SQL procedures that call at least one user-defined function or that are defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE. Otherwise, this task applies to only user-defined functions, external stored procedures, external SQL procedures, and DB2-supplied stored procedures

#### Procedure

To set up the provided core WLM environments:

Run job DSNTIJRW.

Job DSNTIJRW invokes the DSNTWLMB tool to create the core WLM

environments. The CLIST assigns the core WLM environment names in DSNTIJRW according to the values that are specified on panel DSNTIPR1. For detailed information about the environments that are created by DSNTIJRW, see “Core WLM environments for DB2-supplied routines” on page 884.

**Related concepts:**

WLM management of stored procedures

**Related reference:**

DSNTWLMB tool

DSNTIPR1: Parameters for DB2-supplied routines panel

## Installing DB2-supplied routines during installation

The DSNTIJRT and DSNTIJRV jobs install and validate the installation of DB2-supplied routines. These jobs are configured with the options that you specified on installation panel DSNTIPR1 and panels DSNTIPRA through DSNTIPRP.

### Before you begin

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that runs the DSNTIJRV job requires READ access. To grant READ access to a user, an administrator must submit the following command:

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
```

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that runs the DSNTIJRV job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVfy console that is used in this job. To add a discrete profile for the DSNTRVfy console, an administrator must complete the following steps:

1. Establish a discrete profile for MVS.MCSOPER.DSNTRVfy by issuing the following command:  

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNTRVfy UACC(NONE)
```
2. Grant READ access to the user that runs the DSNTIJRV job by issuing the following command:  

```
PERMIT MVS.MCSOPER.DSNTRVfy CLASS(OPERCMDS) ID(user) ACCESS(READ)
```
3. Refresh the OPERCMDS class by issuing the following command:  

```
SETROPTS RACLIST(OPERCMDS)REFRESH
```

Resource Recovery Services (RRS) is also required for these jobs.

### Procedure

To install the DB2-supplied routines:

1. Run job DSNTIJRT to install and configure all DB2-supplied routines.
2. After DSNTIJRT successfully completes, run job DSNTIJRV to validate the installation of the routines.
3. Authorize the appropriate users to use one or more of these stored procedures by issuing the GRANT EXECUTE statement.

As part of the installation process, job DSNTIJRT defines, binds, and grants access to the stored procedures and user-defined functions. Job DSNTIJRT grants EXECUTE authority to the authorization IDs that are specified for the GRANT EXECUTE fields on installation panels DSNTIPRB through DSNTIPRP.

The default setting for GRANT EXECUTE is PUBLIC, meaning that anyone who can access DB2 can use these stored procedures.

**Recommendation:** When you run the installation CLIST, use the GRANT EXECUTE fields on panels DSNTIPRB through DSNTIPRP to specify different access lists.

**Important:** DSNAXP can execute the EXPLAIN statement on any explainable SQL statement that is valid on the system, and the EXPLAIN output can reveal potentially sensitive information. The privileges to run DSNAXP should therefore be granted with consideration. For example, you should avoid granting access for DSNAXP to PUBLIC.

4. Complete additional setup steps for any of the following routines that you plan to use.
  - The stored procedures for XML schema support
  - The administrative task scheduler routines and administrative enablement routines
  - The CICS transaction invocation procedure
  - The DSNAXP EXPLAIN stored procedure
  - The common SQL API stored procedures
  - The WebSphere MQ user-defined functions
  - The web service user-defined functions


## What to do next

After installing the DB2-supplied routines, you can choose to disable any of the routines that are unnecessary or unusable on your subsystem.

### Related concepts:

Configuration control statements for DB2-supplied routines

### Related tasks:

 Granting privileges for executing stored procedures and stored procedure packages (Managing Security)

Disabling DB2-supplied routines for validation

### Related reference:

Core WLM environments for DB2-supplied routines

## Job DSNTIJRT

Job DSNTIJRT installs and configures DB2-supplied routines by executing program DSNTRIN.

DSNTIJRT provides a *configuration control statement* for each DB2-supplied routine and the mode for processing those statements. The configuration control statement specifies the WLM environment, list of authorization IDs that are allowed to execute the routine, and optional package owner for the routine. DSNTRIN reads and validates those statements and uses them to create and customize routines and supporting objects.

## Format

DSNTRIN accepts the following parameters:

**DB2SSN**

Identifies the DB2 subsystem on which to install and configure the DB2-supplied routines.

**MODE**

During SQL processing, DSNTRIN configures each routine with the WLM environment specified in the configuration control statement for that routine. Processing behavior depends on the DSNTRIN run mode, the DB2 catalog mode, and which objects already exist.

**INSTALL**

This is the normal operating mode. Use it when installing or migrating to DB2.

Create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the routine already exists, it is updated, if necessary, to use the WLM environment specified in the configuration control statement for that routine. If the package for a routine already exists, it is not bound again unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

**REINSTALL**

This mode behaves like INSTALL mode, except that existing DB2-supplied routines and created global temporary tables are dropped ahead of other processing. Existing related databases, table spaces, tables, and indexes are not dropped, except as discussed in the special notices section of the DSNTIJRT job prolog.

Use REINSTALL mode only if you have a specific need to drop and re-create all DB2-supplied routines. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines and any related created global temporary tables are first dropped before they are re-created. Related databases are not dropped if they already exist, but they are created if they do not exist. If a supporting object is used by more than one routine, the object is created when one of those routines is first created. Drop processing of routines and related objects that do not exist is bypassed.

**REINITIALIZE**

This mode behaves like REINSTALL mode, except that existing databases, table spaces, tables, and indexes used by the DB2-supplied routines are also dropped ahead of other processing.

REINITIALIZE mode drops and reinitializes databases such as the XSR database that may contain information needed by DB2 for other processing. Therefore, use REINITIALIZE mode only when advised to do

so by IBM Software Support. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines, existing related created global temporary tables, and existing related databases are first dropped before they are re-created. After each SQL statement, a COMMIT statement is issued. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

#### **INSTALL-PREVIEW**

Simulate INSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

#### **REINSTALL-PREVIEW**

Simulate REINSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

#### **REINITIALIZE-PREVIEW**

Simulate REINITIALIZE mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

#### **AUTHID**

DSNTRIN uses this value as the CURRENT SQLID for creating and configuring most DB2-supplied routines. DSNTRIN also uses this value as the default OWNER for binding packages for the DB2-supplied routines that do not have the PKGOWNER specified in the configuration control statement.

#### **SECDEFID**

DSNTRIN uses this value as the CURRENT SQLID setting when creating and configuring DB2-supplied routines that are defined with the SECURITY DEFINER option.

The ID that you specify for SECDEFID must be an ID that can be used as a logon ID, because WLM uses the ID to execute DB2-supplied routines that are defined with SECURITY DEFINER.

### **Input**

DSNTRIN allocates the following DD statements for input:

#### **DBRMLIB**

Location of the DBRMs for DB2-supplied routines. This is typically the *prefix.SDSNDBRM* target library.

#### **SYSUT1**

Internal work file for the DB2 installation bind interface (DSNTRBI).

#### **CFIGIN**

Location of the configuration control statements for DB2-supplied routines.

## **DB2OPT**

This required DD can contain the following optional parameters:

### **STOGROUP**

Specifies a storage group to use for creating databases and table spaces that are used by the routines that are supplied with DB2. If this parameter is not specified, the default SYSDEFLT storage group is used.

### **INDEXSTOG**

Specifies a storage group to use for creating indexes instead of the default SYSDEFLT storage group.

**BP4K** Specifies an alternate 4-KB buffer pool for base table spaces that are created by DSNTRIN. The default 4-KB buffer pool is BP0.

**BP8K** Specifies an alternate 8-KB buffer pool for base table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

### **BP16K**

Specifies an alternate 16-KB buffer pool for base table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

### **BP32K**

Specifies an alternate 32-KB buffer pool for base table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K.

### **LOBBP8K**

Specifies an alternate 8-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

### **LOBBP16K**

Specifies an alternate 16-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

**Note:** DSNTRIN does not create or activate this storage group or any of these buffer pools.

## **Output**

DSNTRIN allocates the following DD statements for output:

### **SYSPRINT**

Destination for echo of configuration control statements that are read and for messages that are generated during processing. Each processed routine generates at least one status message.

### **SYSTSPRT**

Internal message file for the DB2 installation bind interface (DSNTRBI).

### **CFIGOUT**

Destination for configuration control statements that are read by DSNTRIN. This output is useful for diagnostic purposes when DSNTRIN reports an error in a configuration control statement.

### **SQLOUT**

Destination for DDL statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### **BINDOUT**

Destination for bind statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

## JCLOUT

Destination for a generated sample job that is generated when one of the PREVIEW modes is specified. The job contains steps that process inline DDL and bind statements that are needed to install and configure missing, downlevel, or incorrectly configured DB2-supplied routines. This DD is required if you specify a PREVIEW mode.

Example of executing DSNTRIN in INSTALL mode:

```
//DSNTRIN EXEC PGM=DSNTRIN
//      PARM=('DB2SSN(VA1A) MODE(INSTALL) AUTHID(AUTHID) SECDEFI-
//      D(ADMF001)')
//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//      DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//DB2OPT DD *
//      STOGROUP(DB2_ROUTINES_GROUP)
//      INDEXSTOG(DB2_INDEX_GROUP)
//      BP4K(BP0)
//      BP8K(BP8K0)
//      BP16K(BP16K0)
//      BP32K(BP32K)
//      LOBBP8K(BP8K0)
//      LOBBP16K(BP16K0)
//      LOBBP32K(BP32K0)
/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)
...
/*
```

Example of executing DSNTRIN in INSTALL-PREVIEW mode:

```
//DSNTRIN EXEC PGM=DSNTRIN
//      PARM='DB2SSN(VA1A) MODE(INSTALL-PREVIEW) AUTHID(AUTHID) '
//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//      DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//JCLOUT DD DSN=USER.JCLLIB(DB2INST),DISP=SHR
//DB2OPT DD *
//      STOGROUP(DB2_ROUTINES_GROUP)
//      INDEXSTOG(DB2_INDEX_GROUP)
//      BP4K(BP0)
//      BP8K(BP8K0)
//      BP16K(BP16K0)
//      BP32K(BP32K)
//      LOBBP8K(BP8K0)
//      LOBBP16K(BP16K0)
//      LOBBP32K(BP32K0)
```

```

/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)
...
//*

```

**Related concepts:**

Configuration control statements for DB2-supplied routines  
Installation and migration jobs that the CLIST tailors

**Related reference:**

Core WLM environments for DB2-supplied routines

**Job DSNTIJRV**

Job DSNTIJRV validates the DB2-supplied routines by executing program DSNTRVFY. You should validate these routines after DB2 installation and after each phase of migration.

DSNTRVFY validates a single routine, multiple routines, or all DB2-supplied routines. DSNTRVFY produces a report that identifies routines that passed the validation and possible problem areas for routines that failed.

**Note:** DSNTRVFY creates, calls, and drops two temporary stored procedures. These temporary stored procedures are SYSPROC.DSNWLM\_INSTALL\_INFOJ and SYSPROC.DSNWLM\_INSTALL\_INFO. Both of these stored procedures exist only when DSNTRVFY is executing. DSNTRVFY calls SYSPROC.DSNWLM\_INSTALL\_INFOJ to validate the WLM environment that is assigned to each DB2-supplied Java routine. DSNTRVFY calls SYSPROC.DSNWLM\_INSTALL\_INFO to validate the WLM environment that is assigned to each DB2-supplied non-Java routine that runs in a WLM environment.

**Authorizations**

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that submits this job requires READ access.

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that submits this job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVFY console that is used in this job.

**Format**

DSNTRVFY accepts the following required parameters:

**DB2SSN(ssid)**

Identifies which DB2 subsystem to connect to for validating the DB2-supplied routines.

**ROUTINE(name)**

Identifies which DB2-supplied routine needs to be validated. The following values are supported for *name*:



- A routine name in the form of *schema-name.routine-specific-name*.
- The keyword **DD:SYSIN** to specify a list of routines. List the routines in the form of *schema-name.routine-specific-name* under the SYSIN DD statement with one routine per line.
- The keyword **ALL** to specify all DB2-supplied routines.

DSNTRVFY also accepts the following optional parameters:

**AUTHID(authorization ID)**

DSNTRVFY uses this value as the OWNER for BIND PACKAGE and BIND PLAN statements and as the CURRENT SQLID for issued SQL statements. If this value is not specified, the primary authorization ID is used for BIND PACKAGE, BIND PLAN, and issued SQL statements.

**Output**

DSNTRVFY allocates the following required DD statements for output:

**SYSPRINT**

Contains messages generated during verification processing. Each processed routine can generate one or more messages.

**SYSTSPRT**

DSNTRVFY writes bind output to SYSTSPRT if an error occurs during bind processing.

The following JCL example is for validating a single routine:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,
//          PARM='DB2SSN(VA1A) ROUTINE(SYSPROC.DSNUTILS)'
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
```

The following JCL example is for validating multiple routines:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,
//          PARM='DB2SSN(VA1A) ROUTINE(DD:SYSIN)'
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
          SYSPROC.DSNWZP
          SYSPROC.DSNACCOR
          SYSPROC.DSNUTILS
          SYSPROC.DSNUTILU
```

The following JCL example is for validating all routines:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,
//          PARM='DB2SSN(VA1A) ROUTINE(ALL) AUTHID(FVTGRP2)'
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
```

## Processing

DSNTRVfy completes the following validation:

- Verifies that the routine is defined to the SYSIBM.SYSROUTINES catalog.
- Verifies that the collection ID defined in the SYSIBM.SYSROUTINES catalog table matches the collection ID used to bind the package.
- Verifies that the routine is currently defined with the DB2-reserved WLM application environment name DSNWLM\_NOT\_ENABLED, indicating that it is not enabled to run on the current DB2 subsystem. If it is, then a warning message is issued and the validation is bypassed.
- Verifies if the routine can be executed on the current DB2 catalog mode.
- Verifies the APF authorization requirements.
- Verifies if the WLM application environment is defined and available for use.
- Verifies if the NUMTCB setting is valid or within the recommended range.
- Verifies if the required DD statements for some of the routines are defined.
- Verifies if the WLM environment assigned to Java routines is enabled for Java.
- Verifies security coexistence requirements (for example, some routines should run on only their own WLM application environment).
- Verifies that the selected routine can be called successfully. Certain routines such as DSNACICS, DSNAIMS, MQSeries functions, and most debugger routines are restricted to basic validation and are not called.

During the running of this job, the following message might be issued on the system console:

```
IEFC452I DB2UDSMD - JOB NOT RUN - JCL ERROR
```

In most cases, this message is normal and can be disregarded. If you use IBM Optim™ Development Studio, see Debugging stored procedures on DB2 for z/OS with Optim Development Studio, Part 2 (IBM developerWorks) for information about DB2UDSMD.

If the validation is successful, the following message is issued:

```
DSNT027I DSNTRVfy VALIDATION FOR schema.routine-specific-name SUCCESSFUL
```

If the validation fails, messages are issued to explain the reasons for failure. Examine these messages and make necessary adjustments before running the validation job again.

## Input

DSNTRVfy requires the following DD statements for input:

### DBRMLIB

Identifies the library where the DBRM for the DSNTRVfy program is located. This is typically the *prefix*.SDSNDBRM target library.

### SYSIN

Contains the list of DB2 routines. This is required when the validation type is for multiple routines (DD:SYSIN).

### SYSUT1

Work data set required for bind processing.

## Limitations

The following limitations apply to the DSNTRVfy program:

- The name of the routine in the form *schema-name.routine-specific-name* is limited to 72 characters, the maximum line length in JCL.
- Only DB2 10 DB2-supplied routines are supported for validation.
- Some routines, if enabled, receive basic validation to ensure that they are defined correctly and assigned to a valid WLM application environment. However, validation will not extend to calling these routines for one or more of the following reasons:
  - Optional system support such as CICS, IMS, or MQSeries is required.
  - External setup on a remote server or workstation is required.
  - A call could introduce or modify data unexpectedly in a production environment.

The DB2-supplied routines that are restricted to basic validation are:

- DB2DEBUG.CREATE\_SESSION
- DB2DEBUG.DESTROY\_SESSION
- DB2DEBUG.GET\_REPORT
- DB2DEBUG.LIST\_SESSION
- DB2DEBUG.PUT\_COMMAND
- SYSFUN.SYSTS\_ENCRYPT
- SYSFUN.XSLTRANSFORM
- SYSPROC.ADMIN\_COMMAND\_UNIX
- SYSPROC.ADMIN\_JOB\_CANCEL
- SYSPROC.ADMIN\_JOB\_FETCH
- SYSPROC.ADMIN\_JOB\_QUERY
- SYSPROC.ADMIN\_JOB\_SUBMIT
- SYSPROC.DBG\_ENDSESSIONMANAGER
- SYSPROC.DBG\_INITIALIZECLIENT
- SYSPROC.DBG\_RECVCLIENTREPORTS
- SYSPROC.DBG\_SENDCLIENTREQUESTS
- SYSPROC.DBG\_SENDCLIENTCOMMANDS
- SYSPROC.DBG\_TERMINATECLIENT
- SYSPROC.DSNACICS
- SYSPROC.DSNAIMS
- SYSPROC.DSNAIMS2
- SYSPROC.DSNLEUSR
- SYSPROC.SYSTS\_ALTER
- SYSPROC.SYSTS\_CREATE
- SYSPROC.SYSTS\_DROP
- SYSPROC.SYSTS\_RESTORE
- SYSPROC.SYSTS\_START
- SYSPROC.SYSTS\_STOP
- SYSPROC.SYSTS\_TAKEOVER
- SYSPROC.SYSTS\_UPDATE

- All MQSeries, web services, and SOAP functions (those with schema DB2MQ, DB2MQ1C, DB2MQ2C, or DB2XML)

---

## Installation step 21: Back up the DB2 directory and catalog: DSNTIJIC

For backup purposes, create a copy of the DB2 directory and catalog.

### About this task

**Attention:** If you do not create this copy, DB2 can start. However, if errors that require you to reinstall DB2 occur in the directory or catalog and you do not have backup copies, you lose all your tables and data.

**Recommendation:** Copy the catalog and directory at least daily if you make any changes in them. Recovery time for these databases is longer if the copies are not current, and the entire subsystem is affected.

### Procedure

To create an image copy of the directory and catalog:

1. Examine job DSNTIJIC for the following information:
  - The tape unit name. The job lists the tape unit name as TAPE. If this is incorrect for your site, correct it. The name TAPE is also the unit name for the default archive log data sets.
  - Expiration date or retention period. You can add a retention period or an expiration date to the job.
  - The user on the JOB statement. Ensure that the user is authorized. If DB2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.
2. Run job DSNTIJIC.

The DSNTIJIC job contains a list of all the DB2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the DB2 image copy utility to copy these table spaces to tape. Having copies of table spaces enables you to recover the DB2 catalog and DB2 directory in case of a failure.
3. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape setup for image copy. If you find no problems with the tape setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

### What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

#### Related concepts:

 Privileges and authorities (Managing Security)

#### Related tasks:

Installation step 17: Define and bind DB2 objects: DSNTIJSG

Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)

## Installation step 22: Set up the administrative task scheduler

You can use the administrative task scheduler to execute administrative tasks according to a time-based or event-based schedule.

### Before you begin

You should have run job DSNTIJRA and job DSNTIJIN before you set up the administrative task scheduler.

### About this task

**Restriction:** After migration to conversion mode (from Version 8 or Version 9), the administrative task scheduler is disabled until you run job DSNTIJRT.

The following figure shows an overview of the steps for installing and configuring the administrative task scheduler.

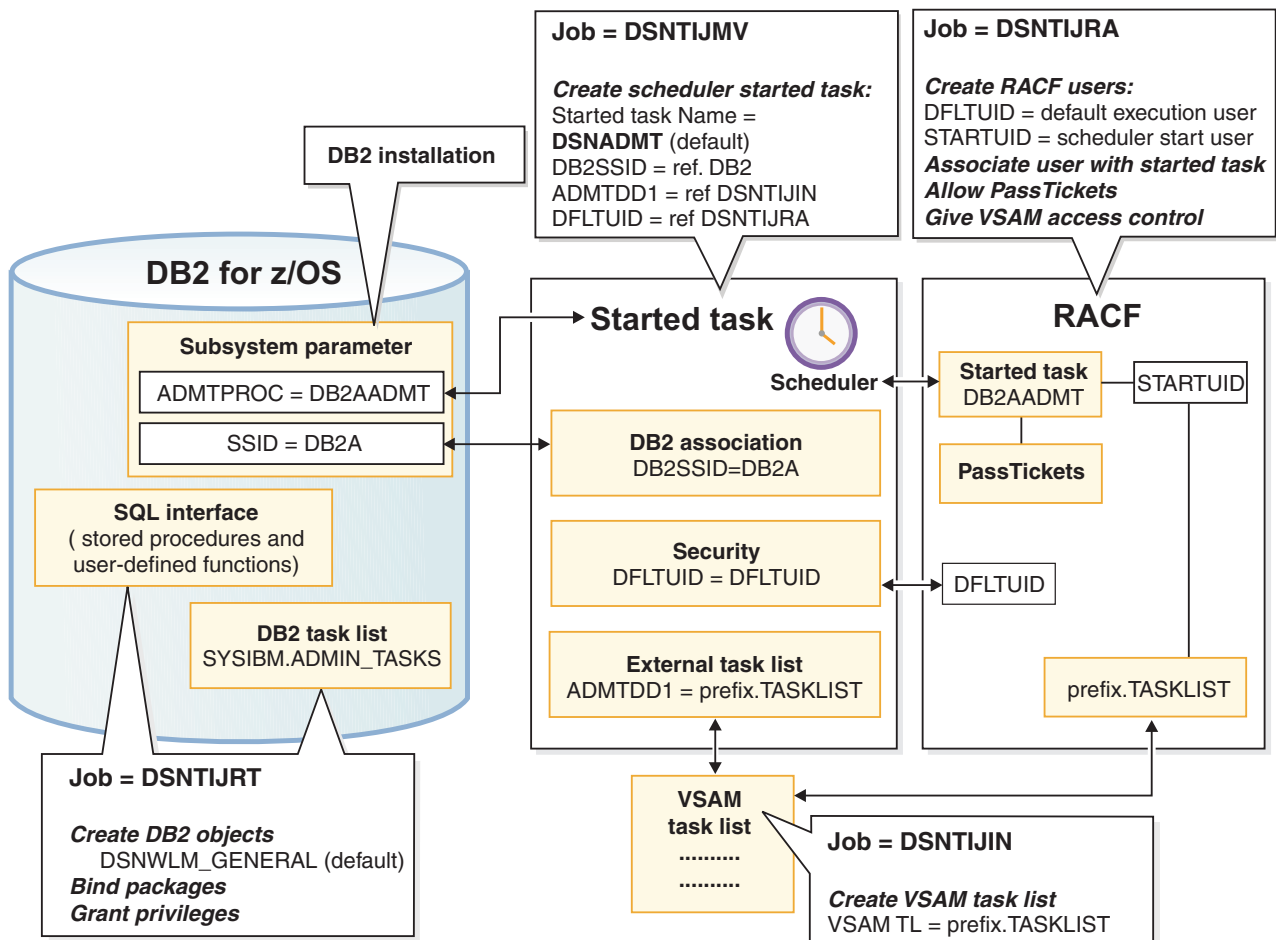


Figure 74. Setting up the administrative task scheduler

### Procedure

To set up the administrative task scheduler:

1. Customize the administrative task scheduler address space startup procedure (xxxxADMT) in job DSNTIJMV. The name of the startup procedure needs to

match the value of the ADMTPROC subsystem parameter. Before using the startup procedure, locate and review the settings for the following parameters:

#### **DB2SSID**

The name of this DB2 subsystem.

#### **DFLTUID**

The default ID that is used by the administrative task scheduler to execute its tasks. DFLTUID must be different than the ID that is used to start this address space.

#### **TRACE**

Indicates whether to activate tracing for the administrative task scheduler. The value can be ON or the default value of OFF.

You can specify other parameters, such as ERRFREQ, MAXHIST, MAXTHD, or STOPONDB2STOP in the startup procedure similarly to the three parameters DB2SSID, DFLTUID and TRACE.

#### **ERRFREQ**

Specifies how frequently message DSN A679I displays on the console, indicating that one of the redundant, active copies of the task list is not accessible. By default, this message displays on the console once per minute, for example, when DB2 is offline.

#### **MAXHIST**

Specifies the number of status entries per task that are stored. This parameter is a positive integer with a default value of 10. When the limit is reached, the oldest status entries are deleted.

#### **MAXTHD**

Specifies the maximum number of execution threads for an administrative task scheduler. The default value is 99.

#### **STOPONDB2STOP**

Specifies that the administrative task scheduler will terminate when DB2 is stopped.

Also locate and review the ADMTDD1 DD statement. The VSAM data set that is indicated must match the VSAM task list data set that is defined in job DSNTIJIN.

The following example shows how these parameters can be updated.

```
//DSNADMT PROC LIB='DSN!!0.SDSNLOAD',
//          DB2SSID=DSN,
//          DFLTUID=DFLTUID,
//          TRACE=OFF,
//          MAXTHD=10
// *
//STARTADM EXEC PGM=DSNADMT0,DYNAMNBR=100,REGION=0K,
//          PARM=('DB2SSID=&DB2SSID',
//              'DFLTUID=&DFLTUID',
//              'TRACE=&TRACE'
//              'MAXTHD=&MAXTHD'
//              'ERRFREQ=1440'
//              'STOPONDB2STOP')
//STEPLIB DD DISP=SHR,DSN=&LIB
//ADMTDD1 DD DISP=SHR,DSN=DSNC!!0.TASKLIST
```

2. Ensure that the administrative task scheduler routines were enabled. They were enabled by job DSNTIJRT.
3. Create a job to make image copies of the administrative task scheduler table spaces. Establish a schedule for making image copies. In general, you should back up important databases on a regular basis. The database for the

administrative task scheduler is no exception and should be copied on the same frequency as the DB2 catalog and directory. The following example shows how to copy the table spaces in this database to stacked data sets on tape with a retention period of 99 days:


```
/*
//DSNTIC EXEC PGM=DSNUTILB,PARM='DSN,IMAGCOPY',COND=(4,LT)
//SYSRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//DSNTRACE DD SYSOUT=*
//SYSLISTD DD *
LISTDEF DSNLDEF
INCLUDE TABLESPACES DATABASE DSNADMDB
//SYSIN DD *

TEMPLATE DSNTPLT
DSN(prefix.IMAGCOPY.&DB.;&TS.;)
DISP (NEW,KEEP,DELETE)
UNIT TAPE
STACK YES
RETPD 99
COPY LIST DSNLDEF
COPYDDN(DSNTPLT)
/*
```

#### **Related concepts:**

Administrative task scheduler address space storage requirements


Job DSNTIJRT

 [Multi-threading in the administrative task scheduler \(DB2 Administration Guide\)](#)


#### **Related tasks:**

Installation step 4: Define system data sets: DSNTIJIN

Additional steps for enabling the administrative task scheduler and administrative enablement routines

 [Scheduling administrative tasks \(DB2 Administration Guide\)](#)

#### **Related information:**

 [DSNA677I \(DB2 Messages\)](#)

---

## **| Installation step 23: Verify a successful installation**

To verify that your installation process ran successfully, you can run the sample applications.

### **About this task**

Select the phases that you need to run based on the attachment facilities you installed, the languages you use, and whether the sample objects exist.

#### **Related tasks:**

Verifying that installation or migration was successful with the sample applications

---

## **| Installation step 24: Enable additional capabilities for DB2**

After you complete the previous steps, you can enable additional capabilities for DB2, such as support for a communications network and support for Java.

## Support for a communications network

After you install DB2, you can install support for a communications network.

**Recommendation:** If you plan to use the distributed data facility (DDF), become familiar with the DDF function and the kind of network communications that you want to use to communicate with this DB2 subsystem. Depending on the network communications that you use, you must install Virtual Telecommunications Access Method (VTAM), z/OS UNIX System Services TCP/IP support, or both. In DB2 10, you can set up DDF not to activate SNA/APPC support. Therefore, in DB2 10, DDF does not require VTAM to be installed. You might need to install VTAM for other reasons.

### Installing NetView®

If you use DDF, you might want to install NetView so that DB2 can send alerts to NetView if DB2 detects security exposures or protocol errors.

#### Related concepts:


Customize VTAM for DB2


TCP/IP terminology

#### Related tasks:

Connecting systems with VTAM

#### Related reference:

 [SNA Network Implementation Guide](#)

 [IBM Tivoli NetView for z/OS \(Installation: Getting Started\)](#)

## Support for Java

If you plan to use Java, or any function that is dependent on Java, you need to install support for it.

For information about installing support for Java, see *Installing the IBM Data Server Driver for JDBC and SQLJ on DB2 for z/OS (DB2 Application Programming for Java)*.

### Prerequisite for accessing DB2 10 for z/OS from a DB2 for Linux, UNIX, and Windows Version 10.5 Java client

If you use IBM Data Server Driver for JDBC and SQLJ Version 3.66 or 4.16, which is shipped with DB2 for Linux, UNIX, and Windows Version 10.5, to access DB2 10 for z/OS, you need to apply PTF UK91146 for APAR PM79161 to your DB2 for z/OS subsystem. Otherwise, abend 0C4-00000038 occurs on the DB2 for z/OS subsystem when Java client applications attempt to connect.

## Installing the Unified Debugger session manager on a z/OS system

The session manager can handle communications between a debug client, such as the debug client of IBM Data Studio, and a DB2 for z/OS data server. The session manager can run on the client on which the Unified Debugger is installed, or on a z/OS system. For better performance when you debug DB2 for z/OS routines, you can install the session manager on a z/OS system.



## Before you begin

- Ensure that the session manager file, `db2dbgm.jar`, was installed on the z/OS system during the DB2 for z/OS installation process. It should be in HFS directory `/usr/lpp/db2a10/base/classes`.

## About this task

The session manager that you install on a z/OS system is compatible with all currently supported versions of DB2 for z/OS. However, this could change in the future.

## Procedure

To install the session manager on a z/OS system, follow these steps:

1. Create the JCL for a started task that runs the session manager, in a member named `DB2UDSMD` in the system `PROCLIB`.

This step is described in [Creating the JCL for the session manager started task](#).

2. Define the `DB2UDSMD` started task to RACF.

This step is described in [Defining the session manager started task to RACF](#).

3. Create an HFS file for the environment settings that are used by the session manager.

This step is described in [Creating an environment settings file for the session manager](#).

4. Verify that the session manager was installed correctly.

This step is described in [Testing the session manager installation](#).

5. Specify in the IBM Data Studio routine debugger preferences that you want to use the session manager that is on the z/OS system by selecting the option "Run the session manager on each connected server."

The port number must match the port number that you specify when you start the `DB2UDSMD` started task. If you do not specify a port number when you start `DB2UDSMD`, the port number that you specify in the routine debugger preferences must match the default port number in the `DB2UDSMD` started task JCL.

The port number can identify a session manager anywhere on the network. A session manager is associated with a z/OS system or LPAR, and not with a specific DB2 for z/OS subsystem or data sharing group.

6. Optional: Set up additional session managers.

A single debug session can connect to only a single session manager. However, you can follow these steps to connect to another session managers on the same z/OS system.

- a. In the IBM Data Studio routine debugger preferences, specify a different port to which you want the Unified Debugger to connect.

- b. Start `DB2UDSMD` with the port number that you specified in the previous step.

For example:

```
START DB2UDSMD,PORT=4558
```

To set up additional session managers on different LPARs, follow these steps:

- a. Create the JCL for a started task that runs the session manager, in a member named `DB2UDSMD` in the system `PROCLIB` of the LPAR.

- b. In the IBM Data Studio routine debugger preferences, specify a port to which you want the Unified Debugger to connect.

- c. Start DB2UDSMD with the port number that you specified in the previous step.

## Creating the JCL for the session manager started task

You need to create a member named DB2UDSMD in the system PROCLIB. DB2UDSMD contains the JCL to start a session manager.

### Procedure

Customize and run the JCL that is shown in this example to create the DB2UDSMD started task JCL. See the comments in the example for the values that you need to change.

**Important:** The started task must be named DB2UDSMD.

```
//UDBG3 JOB CLASS=A,
// MSGCLASS=H,MSGLEVEL=(1,1), REGION=4096K,
// USER=STDTSKID,PASSWORD=STDTSKPW
/*-----
/* This job creates the started task JCL for DB2UDSMD. You can then
/* launch the Unified Debugger session manager on z/OS with a
/* START command.
/* - Change STDTSKID and STDTSKPW to the user ID and password that
/* are associated with the started task.
/* The ID that is associated with the started task is defined in
/* the RACF STARTED class profile DB2UDSMD.**
/*-----
/* This step uses IEBUPDTE to write a JCL member into your system
/* PROCLIB.
/* - Change SYS1.PROCLIB to the name of your system PROCLIB.
/*-----
//WRITEJCL EXEC PGM=IEBUPDTE,PARM=NEW
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//SYSUT2 DD DISP=SHR,DSN=SYS1.PROCLIB
//SYSIN DD DATA
./ ADD NAME=DB2UDSMD
//DB2UDSMD PROC PORT=4553,TIMEOUT=60
/*
/* DB2UDSMD starts the Unified Debugger session manager daemon for
/* UNIX System Services.
/* Change the default PORT and TIMEOUT values to valid values
/* for your z/OS system. You can override these values when
/* you issue the START command for the DB2UDSMD started task.
/*
/* This JCL assumes that no .profile file exists for the user
/* ID under which the started task runs.
/*
/* Environment settings (PATH, CLASSPATH) come from the
/* the file that is specified by the STDENV DD statement.
/* - Change /u/stdtskid/DB2UDSMDenvironment to the path and
/* file name for the environment file.
/* - Change the paths in the STDOUT and STDERR to the appropriate
/* paths for your UNIX System Services installation.
/* Ensure that the user ID under which the started task runs
/* has the privileges to write to STDOUT and STDERR.
//DB2UDSMD EXEC PGM=BPXBATCH,DYNAMNBR=128,REGION=0M,TIME=1440,
// PARM='SH date;java com.ibm.db2.psmg.mgr.Daemon -timeout
// &TIMEOUT -port &PORT -log /dev/null;date'
//STDOUT DD PATH='/tmp/DB2UDSMD.stdout',
// PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
//STDERR DD PATH='/tmp/DB2UDSMD.stdout',
// PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
```

```

// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
//STDENV DD PATH='/u/stdtskid/DB2UDSMDenvironment',
// PATHOPTS=ORDONLY
// PATHOPTS=ORDONLY
./ ENDUP
/*

```

#### Related tasks:

Defining the session manager started task to RACF

#### Related reference:

 BPXBATCH

## Defining the session manager started task to RACF

The started task for the Unified Debugger session manager must be defined to an external security manager, such as RACF.

### Procedure

To define the started task for the session manager to RACF, customize and run JCL similar to this example:

```

//UDBG1 JOB ...
/*-----
/* A security administrator runs this job to define the started task
/* for the Unified Debugger session manager to RACF. The job
/* performs these steps:
/* 1. Defines an OMVS segment for the user ID that is associated
/* with the started task. This step is necessary because the
/* started task runs a Java program from OMVS. In the ALTUSER
/* statement:
/* - Change STDTSKID to the user ID that is associated with
/* the started task.
/* - Change /u/stdtskid to the current working directory for
/* the user's process when the started task issues the OMVS
/* command.
/* 2. Adds a profile for the started task, which is named
/* DB2UDSMD.** to the RACF database.
/* In the RDEFINE statement, change STDTSKID to the user ID
/* that is associated with the started task.
/* 3. Activates the started task definition in current memory.
/*-----
//RACFDEF EXEC PGM=IKJEFT01,DYNAMNBR=20
//SYSTSPRT DD SYSOUT=A
//SYSTSIN DD *
ALTUSER STDTSKID OMVS( UID(5) HOME('/u/stdtskid') PROGRAM('/bin/sh') )
RDEFINE STARTED DB2UDSMD.** STDATA(USER(STDTSKID))
SETROPTS RACLIST(STARTED) REFRESH
END

```

#### Related reference:

 z/OS Security Server RACF Command Language Reference

## Creating an environment settings file for the session manager

You need to create a file that holds the environment settings for the Unified Debugger session manager.

### Procedure

Create the file in the home directory of the user ID under which the DB2UDSMD started task runs. The file must specify at least the settings for the ENV, PATH, and CLASSPATH parameters.

Customize and run the JCL that is shown in this example to create the environment settings file.

```
//UDBG2 JOB ...
/*-----
/* Create a file in HFS to hold the environment settings that are used
/* when the Unified Debugger session manager runs as a started task
/* on z/OS.
/*
/* Replace /u/stdtskid with the path that is associated with the
/* home directory of the user ID under which the started task runs.
/* You can use DB2UDSMDenvironment for the environment file name,
/* or change the name to something else. The environment file path
/* and name need to be the same as those specified in the JCL for
/* the session manager started task.
/*-----
//OCOPY EXEC PGM=IKJEFT01,DYNAMNBR=30
//SYSTSPRT DD SYSOUT=*
//HFSOUT DD PATH='/u/stdtskid/DB2UDSMDenvironment',
// PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
//INLINE DD *
#-----
# Environment settings for running the Unified Debugger session manager:

# The _BPX_BATCH_SPAWN=NO and _BPX_SHAREAS=YES settings
# cause the JVM to run in the same address
# space as the z/OS UNIX shell. Doing this avoids launching two
# additional address spaces for the started task.
#
# The ENV variable value identifies the file that contains the
# location of the environment variable settings. For the session
# manager, set the location to this file. Replace
# /u/stdtskid/DB2UDSMDenvironment with the path and file name
# for this file.
#
# The PATH variable value identifies the path name where
# the Java runtime environment binaries and the system binaries
# are located.
#
# The CLASSPATH variable value identifies the location of the
# session manager db2dbgm.jar file.
#
# The JAVA_COMPILER=NONE setting disables the JIT compiler.
# The started task runs the session manager only once, so
# disabling the JIT compiler saves space.
#-----
_BPX_BATCH_SPAWN=NO
_BPX_SHAREAS=YES
ENV=/u/stdtskid/DB2UDSMDenvironment
PATH=/usr/lpp/java170/J7.0/bin:bin
CLASSPATH=/usr/lpp/db2a10/base/classes/db2dbgm.jar
JAVA_COMPILER=NONE
//SYSTSIN DD *
OCOPY INDD(INLINE) OUTDD(HFSOUT) TEXT
```

#### Related tasks:

Creating the JCL for the session manager started task

### Testing the session manager installation

Start the session manager on z/OS to ensure that it was installed correctly.

#### Procedure

1. Issue the following command on the z/OS console.  
START DB2UDSMD,TIMEOUT=1

2. Wait several minutes.  
During that time, the following events occur:
  - a. The started task is launched.
  - b. The session manager program begins.
  - c. The session manager waits for activity for one minute.
  - d. The session manager shuts down.
3. Review the contents of the HFS file that is assigned to STDOUT in the started task JCL.

The following example shows output when the test is successful. The args array contains three keyword and value pairs that indicate:

- The period after which the session manager times out if there is no activity
- The port number of the session manager's network address
- The path name of the file that contains the session manager trace

the timeout, port values, and the location of the log.

```
args[0]: -timeout
args[1]: 1
args[2]: -port
args[3]: 4553
args[4]: -log
args[5]: /dev/null
Code Level: 070418
Debug Session Manager started on IP: 9.30.114.205 - port: 4553
idleTimeOut: 1
```

#### **Related tasks:**

Creating the JCL for the session manager started task

## **Installing a second DB2 subsystem on the same operating system**

If you are considering installing a second DB2 subsystem on the same operating system, first see the implications of a second DB2 subsystem.

### **Implications of a second DB2 subsystem**

The primary consideration in planning for a second DB2 subsystem is its purpose. Using a second subsystem has a substantial impact on your environment.

Second DB2 subsystems are not uncommon; organizations use a second DB2 subsystem to:

- Run separate service levels or releases of the code. This can provide more extensive testing of preventive service or a new DB2 release before use with a production system. Separate levels or releases of DB2 on the same system must have separate libraries.
- Separate test and production activities. This setup can improve DB2 performance and availability for production.

For example, suppose the processor that runs your production subsystem fails. If your test subsystem is on another processor, you can stop the test subsystem and start the production subsystem on that processor. This only works if the requisite DB2 data sets are on shared storage devices and you have used global resource serialization (GRS) (or an equivalent) to protect the production DB2 data sets.

- Prevent access by one class of users to certain data. If this is your primary purpose, reconsider the DB2 authorization scheme.

- Run an application that requires different subsystem parameter settings from other applications or other environments.
- Isolate an application from other applications.

The table below lists other implications of a second DB2 subsystem.

*Table 68. Considerations for installing a second DB2 subsystem*

Considerations	Decisions that you need to make
Libraries	A single, shared library or separate libraries
RACF protection	Resource and ID for the two subsystems
DB2 logging	BSDS, active, and archive log space requirements
Database space requirements	DB2 directory, DB2 catalog, and user data
Performance	Processor and main storage use
Distributed data facility requirements	<ul style="list-style-type: none"> <li>• Location names, logical unit names, and network passwords must be coordinated with remote DB2 subsystems</li> <li>• In a non-data sharing environment, each DB2 subsystem needs a unique TCP/IP port and resync port.</li> </ul>
Common service area (CSA) requirement	DB2 and the IRLM
Shared storage devices	Giving different names to active and archive log data sets, or including those data sets in the GRS inclusion list
ERLY code	Choose a level of ERLY code that is appropriate for all DB2 subsystems.

Each subsystem must have a separate *prefix.SDSNEXIT* library. Sharing the *prefix.SDSNSAMP* library requires coordination to avoid overlaying parameter members.

**Related concepts:**

Active log data sets storage requirements


IRLM address space (IRLMPROC) storage requirements

**Related tasks:**

Loading DB2 libraries for a second DB2 subsystem

Connecting distributed database systems

Enabling multiple DB2 subsystems to share disk storage

 Establishing RACF protection for DB2 (Managing Security)

**Related information:**

 DB2 for z/OS Program Directories

**Loading DB2 libraries for a second DB2 subsystem**

If you are installing a second DB2 subsystem on the same operating system, you might need to create separate libraries for each subsystem.

**About this task**

If the systems have different code releases or different service levels, they must have separate libraries.

## Procedure

To load libraries for a second DB2 subsystem:

1. Separately plan the space for each library.
2. Load the libraries, using different prefixes for each library and for the SMP/E data sets or separate SMP/E zones.

## Tailoring installation jobs for a second DB2 subsystem

Before installing a second DB2 subsystem on the same operating system, change the parameter values that are to be used by the installation jobs during the installation.

### About this task

The following table shows the parameter values that you need to change. For any parameters that are not in the list, check the values and make appropriate changes.

*Table 69. Parameters to change when installing the second subsystem*

Installation panel	Action
DSNTIPA1	For separate libraries, change LIBRARY DATA SET NAME PREFIX and DATA SET NAME PREFIX.
DSNTIPA2	You must change CATALOG ALIAS. You can change the values for the DATA CLASS, MGMT CLASS, and STOR CLASS fields.
DSNTIPA3	You can change the values for the VOL/SER, DATA CLASS, MGMT CLASS, and STOR CLASS fields.
DSNTIPI	Change SUBSYSTEM NAME.
DSNTIPP	Change ICF catalog to match the new ICF catalog. Change all passwords.
DSNTIPM	Change SUBSYSTEM NAME and SUBSYSTEM PREFIX.
DSNTIPL	Change data set names and prefixes.
DSNTIPA	Change data set names and prefixes.
DSNTIPS	Change data set names and prefixes.
DSNTIPR	Change names and password.
DSNTIPC	Check values of DSMAX, EDMPOOL, EDMSTMTC, EDMDBDC, SRTPOOL, and MAXRBLK; no other changes can be made.

## Procedure

To tailor the installation jobs:

Use the installation CLIST to change parameter values as described in the previous table.

### Related tasks:

Tailoring DB2 jobs to your environment using the installation CLIST

## Installing a second DB2 subsystem

When you install a second DB2 subsystem, some installation jobs are optional, some jobs are required, and some jobs are required under certain circumstances.

## Procedure

To install a second subsystem:

1. Optional: Run job DSNTIJSS. You can use job DSNTIJSS to create an SMS environment for the DB2 catalog and directory data sets. Starting in DB2 10, data sets for the catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability.
2. Run job DSNTIJCA if you are defining a new ICF catalog.
3. Run job DSNTIJMV. Add another subsystem name and subsystem recognition character to IEFSSNxx. LNKLSTxx modifications are needed only for separate libraries.

For separate libraries, add STEPLIB statements to the precompile and bind steps for program preparation. Add STEPLIB statements for the DB2 offline utilities. Choose a naming convention for any new procedures, and change those as needed.

For a single library, you must add the exit module data set (*prefix.SDSNEXIT*) to the STEPLIB statement to contain your changed subsystem parameter. Put this data set first in the STEPLIB concatenation.

4. Run job DSNTIJIN. It allocates the following data sets, which contain the sample DBRMs and programs:

```
prefix.DBRMLIB.DATA  
prefix.SRCLIB.DATA  
prefix.RUNLIB.LOAD
```


Two subsystems cannot share these data sets. If undetected sharing occurs, data could be lost. If you use the same library prefix for both subsystems, change the name of the data sets, unless you do not need them on the first subsystem. Subsequent jobs overwrite them, and then the packages that are bound in the first subsystem do not work with the new load modules.

5. Run job DSNTIJUZ without changes if you use separate libraries. For a single library, provide a separate *prefix.SDSNEXIT* data set for each subsystem. The default SSID displayed by certain panels and procedures is the same for every subsystem. Ensure that the correct subsystem is specified in these cases.
6. Run jobs DSNTIJID, DSNTIJIE, and DSNTIJIF to initialize the DB2 data sets.
7. Run job DSNTIJTC to invoke the CATMAINT utility to tailor your DB2 10 catalog.

## What to do next

If you are using RACF, you can define new user profiles and IDs to provide a separate level of security for each DB2 subsystem.

### Related tasks:

 [Granting users and groups access \(Managing Security\)](#)

## Connecting the TSO attachment facility to a second DB2 subsystem

After you install a second DB2 subsystem on the same operating system, you should connect the TSO attachment facility to that subsystem.



## Procedure

To connect the TSO attachment facility:

1. Add STEPLIB statements to the logon procedure if you are using a separate library for the second subsystem or you are managing two different SDSNEXIT data sets. The STEPLIB statement must be authorized using the authorized program facility (APF).  
A DB2 logon procedure can use only one set of DB2 libraries.
2. Concatenate the CLISTs by updating the SYSPROC library if you decide to have a separate library for the second subsystem.
3. Concatenate the DB2I panels by updating the ISPPLIB library if you decide to have a separate library for the second subsystem.
4. Concatenate messages by updating the ISPLIB library if you decide to have a separate library for a second subsystem.
5. Update the ISPF primary option panel (ISR@PRIM) if you decide to have a separate library for the second subsystem.
6. Grant authorization on both subsystems as necessary.
7. Specify the new subsystem name on the DB2I defaults panel as required.

## Connecting the IMS attachment facility to a second DB2 subsystem

After you install a second DB2 subsystem on the same operating system, you should connect the IMS attachment facility to that subsystem.

## Procedure

To connect the IMS attachment facility:

1. For separate libraries, change the STEPLIB DD statement in your startup procedure to refer to the new libraries.
2. For separate libraries, change the DFSESL DD statement in your startup procedure to refer to the new libraries.
3. Define a new subsystem name, language interface token (LIT), and command recognition character (CRC).
4. Define a new language interface and reassemble.
5. In the linkage editor JCL, specify the library that contains the new language interface.

## Preparing a second DB2 subsystem for use

After you have installed a second DB2 subsystem on the same operating system, you must run some jobs that prepare the subsystem for use.

## Procedure

To prepare your second DB2 subsystem for use:

1. IPL z/OS. This step is required for any SYS1.PARMLIB changes. Alternatively, you can use the SETSSI, SETPROG APF, and SETPROG LNKLST commands to define the subsystem to z/OS until the next IPL.
2. Start DB2 by using the new command prefix (formerly called the subsystem recognition character) that you named during the installation process.
3. Run job DSNTIJTC.
4. Run job DSNTIJTM. If you use the same library prefix for both subsystems, change the name of the data sets listed below, unless you do not need them on


the first subsystem. Subsequent jobs write information in these data sets and prevent use of the new load module DSNTIAD on the second subsystem with the previously bound plan DSNTIA91 on the first subsystem.

*prefix.DBRMLIB.DATA*  
*prefix.RUNLIB.LOAD*

5. Run job DSNTIJSG.
6. Optional: Run job DSNTIJRW to define core WLM environments for DB2-supplied stored procedures and user-defined functions.
7. Run job DSNTIJRT to install all DB2-supplied routines.
8. Run job DSNTIJRV to validate the DB2-supplied routines after they have been installed.
9. Verify your installation process. See Verifying your installation process for a second DB2 subsystem for more information.

**Related reference:**

 [z/OS SETPROG Command \(MVS System Commands\)](#)

 [z/OS SETSSI Command \(MVS System Commands\)](#)

## Verifying your installation process for a second DB2 subsystem

After you have installed a second DB2 subsystem and prepared it for use, you should verify a successful installation before you use the subsystem.

### Procedure

To verify your installation:

Run select phases of the sample application jobs, which are named DSNTEJxx. Select the phases that you need based on the attachment facilities that you installed, the languages that you use, and whether the sample objects exist. If you use the same library prefix for both subsystems, change the name of the data sets listed below, unless you do not need them on the first subsystem. Subsequent jobs overwrite information in these data sets and prevent use of the new load modules of sample programs on the second subsystem with the previously bound sample plans on the first subsystem.

*prefix.DBRMLIB.DATA*  
*prefix.SRCLIB.DATA*  
*prefix.RUNLIB.LOAD*

**Related tasks:**

Verifying that installation or migration was successful with the sample applications

## Enabling multiple DB2 subsystems to share disk storage

If you use a non-data sharing environment, you can enable multiple DB2 subsystems to share disk storage. If you use a data sharing environment, the logs must be on shared disk storage.

### Procedure

To share disk storage among DB2 subsystems and avoid problems with your active and archive log data sets:

- Ensure that each subsystem has unique log data set names. This prevents situations like the following:

Subsystem A on operating system 1 and subsystem B on operating system 2 share the same z/OS catalog name, and their log data set names are the same. You start subsystem B while subsystem A is still running on operating system 1. This causes log data sets to be allocated for subsystem A, even though they already exist.

- Use GRS, or an equivalent, and include your active and archive log data sets in the GRS inclusion list. This prevents situations like the following:

Subsystem A on operating system 1 and subsystem B on operating system 2 share disk storage, and the active log is in a shared disk volume. Subsystem B fails. You attempt to start subsystem B, but you accidentally start subsystem A on operating system 2, even though it is still running on operating system 1. This causes log data sets to be allocated for subsystem A, even though they already exist.

## Data loading from remote locations

You can use an SQL cursor with the LOAD utility to load data from a remote location.

Before loading data, you must bind the DSNUT101 package at each location from which you want to load data. A local package for DSNUT101 is bound by installation job DSNTIJSJ when you install or migrate to a new version of DB2 for z/OS.

## Special packages and plans for SPUFI

Special packages and plans for SPUFI are required in some situations.

### Running SPUFI at remote systems

You can use SPUFI to connect to and then execute SQL statements at a remote location.

### Procedure

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To run SPUFI at a remote location:

1. Ensure that DDF is started on the DB2 subsystem where SPUFI runs.
2. Bind the SPUFI packages on each target remote location that is not a DB2 for z/OS server, or on each target remote DB2 for z/OS location where the SPUFI packages have not been bound. For example, use the following commands:

```
BIND PACKAGE (location_name.DSNTIAP) MEMBER(DSNTIAP)
              ACTION(ADD) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')
```

```
BIND PACKAGE (location_name.DSNESPCS) MEMBER(DSNESM68)
              ACTION(ADD) ISOLATION(CS) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')
```

```
BIND PACKAGE (location_name.DSNESPRR) MEMBER(DSNESM68)
              ACTION(ADD) ISOLATION(RR) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')
```

```
BIND PACKAGE (location_name.DSNESPUR) MEMBER(DSNESM68)
              ACTION(ADD) ISOLATION(UR) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')
```

If a BIND PACKAGE command fails because the package already exists, verify that the time and date formats that are returned by the existing packages are satisfactory. If they are, the existing packages can be used without any change to the package list in the SPUFI plans. However, if you need to change the time

and date formats that are returned by the existing packages, you must bind new packages with different collection identifiers that have been agreed to by the database server.

For example, if the collection identifiers are PRIVATCS and PRIVATRR, the commands for doing a remote bind are as follows:

```

BIND PACKAGE (location_name.PRIVATCS) MEMBER(DSNESM68)
           ACTION(ADD) ISOLATION(CS) LIB('prefix.SDSNDBRM')

```

```

BIND PACKAGE (location_name.PRIVATRR) MEMBER(DSNESM68)
           ACTION(ADD) ISOLATION(RR) LIB('prefix.SDSNDBRM')

```

3. Bind the SPUFI plans to include the packages for all target remote locations, including other DB2 for z/OS servers. To include all locations, use an asterisk as the location name of the collection ID. For example, use the following commands:

```

BIND PLAN(DSNESPCS) -
  PKLIST(*.DSNESPCS.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISO(CS) CURRENTDATA(YES) ENCODING(EBCDIC) ACTION(REPLACE)
BIND PLAN(DSNESPRR) -
  PKLIST(*.DSNESPRR.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISOLATION(RR) ENCODING(EBCDIC) ACTION(REPLACE)
BIND PLAN(DSNESPUR) -
  PKLIST(*.DSNESPUR.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISOLATION(UR) ENCODING(EBCDIC) ACTION(REPLACE)

```

The SPUFI plans at the DB2 system must be rebound because the location name parameter (which is usually optional) must be explicitly specified for the remote access functions to construct the correct package name. (SPUFI does not use the SQL statement SET CURRENT PACKAGESET.) The location name entry in the package list must precede any pattern-matching character entry. For example, the package list for the DSNESPCS plan is as follows:

```

PKLIST(location_name.PRIVATCS.DSNESM68, -
       *.DSNESPCS.DSNESM68, -
       *.DSNTIAP.DSNTIAP)

```

The package list for the DSNESPRR plan is as follows:

```

PKLIST(location_name.PRIVATRR.DSNESM68, -
       *.DSNESPRR.DSNESM68, -
       *.DSNTIAP.DSNTIAP)

```

The package list for the DSNESPUR plan is as follows:

```

PKLIST(location_name.PRIVATUR.DSNESM68, -
       *.DSNESPUR.DSNESM68, -
       *.DSNTIAP.DSNTIAP)

```



## Making SPUFI work with different terminal CCSIDs

In some cases, a terminal CCSID might be different from the SPUFI CCSID. If the terminal CCSID cannot be changed to the SPUFI CCSID, consider creating additional SPUFI packages and plans that specify the terminal CCSID encoding.

## About this task

You can then use the SPUFI default panels to use the plans with the special CCSID encoding instead of the DB2-supplied plans (DSNESP02, DSNESP07, and DSNESPUR).

## Procedure

To make SPUFI work with different terminal CCSIDs, use the following example:

Suppose that when you install DB2, you create the SPUFI plans and packages using ENCODING(EBCDIC), and the default subsystem CCSID for EBCDIC data, as specified on installation panel DSNTIPF in the EBCDIC CCSID field. Most of the people in your organization use this CCSID as their terminal CCSID, so they do not encounter errors. However, a large group of DB2 application programmers code in the C language and prefer CCSID 1047 as their terminal CCSID. You can prevent this group from corrupting DB2 data and receiving errors by completing the following tasks:

1. Bind SPUFI packages and plans specifically for users who require a terminal CCSID setting of 1047.

For example, your commands might look like the following commands:

### GUPI

```

BIND PACKAGE(TIAP1047) MEMBER(DSNTIAP) -
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -
  LIBRARY('prefix.SDSNDBRM')
BIND PACKAGE(SPCS1047) MEMBER(DSNESM68) -
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -
  LIBRARY('prefix.SDSNDBRM')
BIND PLAN(SPCS1047) -
  PKLIST(SPCS1047.DSNESM68 -
    TIAP1047,DSNTIAP) -
  ISOLATION(CS) ENCODING(1047) ACTION(REPLACE)
BIND PACKAGE(SPRR1047) MEMBER(DSNESM68) -
  ACTION(REPLACE) ISOLATION(RR) ENCODING(1047) -
  LIBRARY('prefix.SDSNDBRM')
BIND PLAN(SPRR1047) -
  PKLIST(SPRR1047.DSNESM68 -
    TIAP1047,DSNTIAP) -
  ISOLATION(RR) ENCODING(1047) ACTION(REPLACE)
BIND PACKAGE(SPUR1047) MEMBER(DSNESM68) -
  ACTION(REPLACE) ISOLATION(UR) ENCODING(1047) -
  LIBRARY('prefix.SDSNDBRM')
BIND PLAN(SPUR1047) -
  PKLIST(SPUR1047.DSNESM68 -
    TIAP1047,DSNTIAP) -
  ISOLATION(UR) ENCODING(1047) ACTION(REPLACE)
```

### GUPI

2. Grant access to the new packages and plans to the target user group.
3. Instruct users who use terminal CCSID 1047 to specify the following settings in the SPUFI default panels:
  - In panel DSNESP02, specify YES for CHANGE PLAN NAMES.
  - In panel DSNESP07, specify SPCS1047 in the CS ISOLATION PLAN field, SPRR1047 in the RR ISOLATION PLAN field, and SPUR1047 in the UR ISOLATION PLAN field.

The programmers who require CCSID 1047 can now use SPUFI without receiving an error message.

---

## Chapter 6. Migrating DB2 to DB2 10

### Before you begin

Complete the following tasks:

- Prepare your system
- Load the DB2 libraries
- Use the installation CLIST to tailor the DB2 jobs to your environment

### About this task

The full DB2 migration process comprises three progressive catalog levels: conversion mode (from Version 8 or Version 9), enabling-new-function mode (from Version 8 or Version 9), and new-function mode. For details, see Migration modes for DB2 Version 8 to DB2 10 or “Migration modes for DB2 9 to DB2 10” on page 593.

#### Availability of new function in DB2 10

Generally, new SQL capabilities, including changes to existing functions, statements, and limits, become available only in new-function mode, unless explicitly stated otherwise. Exceptions to this general statement include optimization and virtual storage enhancements, which are also available in conversion mode unless stated otherwise. In DB2 Version 8 and DB2 9, most utility functions were available in conversion mode. However, for DB2 10, most utility functions become available in new-function mode.

If you need to revert from enabling-new-function mode (from Version 8 or Version 9) or new-function mode, you might also use conversion mode\* (from Version 8 or Version 9) or enabling-new-function mode\* (from Version 8 or Version 9).

### Procedure

To migrate DB2 to DB2 10:

Complete the following tasks.

#### Related concepts:

“Introduction to migration from DB2 9” on page 592

“Introduction to migration from Version 8” on page 582

**From V8**

Migration modes for DB2 8 to DB2 10

**From V8**

**From V9.1**

Migration modes for DB2 9 to DB2 10

**From V9.1**

#### Related tasks:

Migrating your DB2 subsystem to new-function mode

Migrating your DB2 subsystem to conversion mode (from Version 8 or Version 9)

**Related information:**

 [DB2 10 for z/OS Technical Overview \(IBM Redbooks\)](#)

---

## Introduction to migration from Version 8

*Migration* is the process of upgrading from one DB2 release to a later release. Migration also refers to the process of changing from one migration mode to the next.

You can migrate a Version 8 subsystem that is in new-function mode to DB2 10 without starting the subsystem in DB2 9.

**Important restrictions:**

- A data sharing group that is migrated from Version 8 to DB2 10 cannot have any DB2 9 members.
- If you start a Version 8 subsystem migration to DB2 10, you can fall back to only Version 8.
- If you start a Version 8 subsystem migration to DB2 10 and then fall back to Version 8, you cannot subsequently migrate the subsystem to DB2 9.

**Related concepts:**

Availability of new functions in conversion mode from Version 8 and new-function mode

## Migration modes for DB2 Version 8 to DB2 10

Migration from Version 8 to DB2 10 new-function mode includes five DB2 modes. Four of these modes are differentiated from the modes that are part of migration from DB2 9 to DB2 10.

The names of the modes during migration from Version 8 are:

- Conversion mode from Version 8
- Conversion mode\* from Version 8
- Enabling-new-function mode from Version 8
- Enabling-new-function mode\* from Version 8
- New-function mode

New-function mode is not differentiated by the release from which you are migrating.

Each of the DB2 modes has a corresponding short name that is used in the DB2 output. The short names are also used in some topics to improve readability where multiple mode names are mentioned. The following table shows the short names of the DB2 modes for migration from Version 8 and the corresponding long names.

*Table 70. Long and short names for migration modes*

Short name for migration mode	Long name for migration mode
CM8	Conversion mode from Version 8
CM8*	Conversion mode* from Version 8
ENFM8	Enabling-new-function mode from Version 8



Table 70. Long and short names for migration modes (continued)

Short name for migration mode	Long name for migration mode
ENFM8*	Enabling-new-function mode* from Version 8
NFM	New-function mode

To see the current DB2 mode of a subsystem, issue a DISPLAY GROUP command. The output shows the short name for the migration mode. The definition of each mode is as follows:

**Conversion mode from Version 8**

The state of the catalog after the DB2 10 migration process is complete. In a DB2 data sharing group, members in CM8 can coexist with members that are still in Version 8. New DB2 10 functions are not available for use in CM8. A subsystem that is in CM8 can fall back to Version 8, but not to DB2 9.

**Conversion mode\* from Version 8**

A state that is similar to CM8, but the asterisk (\*) indicates that, at one time, the DB2 subsystem or data sharing group was in ENFM8, ENFM8\*, or NFM. You can still access objects that were created in ENFM8 or NFM. Data sharing groups that have a member in this mode cannot have any Version 8 members. A subsystem that is in CM8\* cannot fall back to Version 8.

**Enabling-new-function mode from Version 8**

A transitional state that indicates that the DB2 subsystem or data sharing group is in the process of enabling new function. New DB2 10 functions are not available in ENFM8. A subsystem that is in ENFM8 cannot return to CM8, but it can revert to CM8\*. A subsystem that is in ENFM8 cannot fall back to Version 8 or coexist with a Version 8 subsystem.

**Enabling-new-function mode\* from Version 8**

A transitional state that is similar to ENFM8, but the asterisk (\*) indicates that, at one time, the DB2 subsystem or data sharing group was in NFM. In ENFM8\*, you can still access objects that were created in NFM, but you cannot create new objects. A subsystem that is in ENFM8\* can revert to CM8\*, but it cannot fall back to Version 8 or coexist with a Version 8 subsystem.

**New-function mode**

The state of the catalog after enabling-new-function mode processing is complete and job DSNTIJNF runs successfully. The catalog has been marked as being in new-function mode. All new DB2 10 and DB2 9 functions are available in NFM. A subsystem that was migrated to DB2 10 NFM from CM8 can revert to CM8\* or ENFM8\*. However, it cannot fall back to Version 8 or coexist with a Version 8 subsystem.

The process of migrating from Version 8 to DB2 10 begins with migration to CM8. From there, you can migrate to ENFM8 and then to NFM.

The flow from one mode to another during migration is illustrated in the following figure:

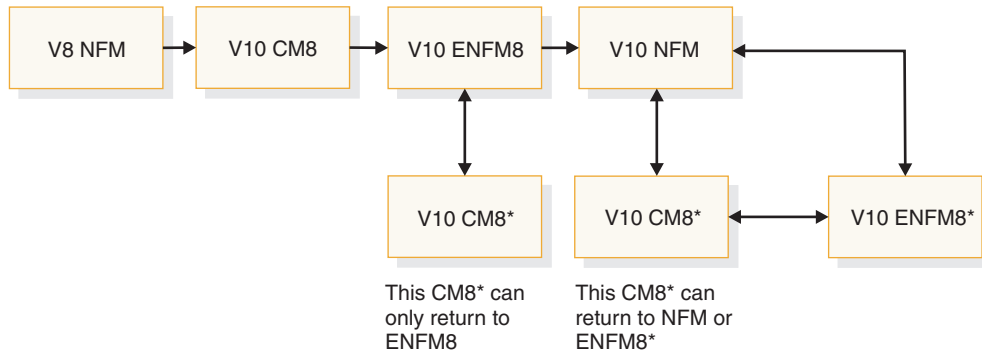


Figure 75. The flow from one mode to another during migration

CM8\* and ENFM8\* are optional modes that you can revert to if you encounter problems in another mode or if you want to temporarily prevent the use of new function.

Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

**Availability of new function in DB2 10**

Generally, new SQL capabilities, including changes to existing functions, statements, and limits, become available only in new-function mode, unless explicitly stated otherwise. Exceptions to this general statement include optimization and virtual storage enhancements, which are also available in conversion mode unless stated otherwise. In DB2 Version 8 and DB2 9, most utility functions were available in conversion mode. However, for DB2 10, most utility functions become available in new-function mode.

**Related tasks:**

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJS)

**Related reference:**

-DISPLAY GROUP (DB2) (DB2 Commands)

**Migration to conversion mode from Version 8: Summary**

After you load the DB2 libraries and run the installation CLIST, you can migrate your Version 8 subsystem to DB2 10. When you finish migration, your subsystem is in DB2 10 conversion mode from Version 8.

Migration to conversion mode from Version 8 includes the steps in the following table.

Table 71. Overview of steps for migrating to DB2 10 conversion mode from Version 8

Step	Description	Job
1	Check for changes to DB2 that might impact your migration to DB2 10 conversion mode from Version 8. Make adjustments for release incompatibilities. Perform premigration activities to determine unsupported objects.	DSNTIJPM
2	Run DSN1COPY with the CHECK option on the catalog table spaces, and invoke DSN1CHKR to check for broken links on your Version 8 subsystem.	none
3	Optionally, determine which packages will be invalid after migration.	none
4	Optionally, check for consistency between catalog tables.	none
5	Take an image copy of your Version 8 catalog.	DSNTIJIC
6	Establish the TSO environment for DB2.	DSNTIJVC
7	Optionally, connect DB2 to IMS.	none
8	Optionally, connect CICS to DB2.	none
9	Stop your Version 8 subsystem.	none
10	Optionally, back up your Version 8 volumes.	none
11	Define DB2 initialization parameters.	DSNTIJUZ
12	Optionally, establish subsystem security.	none
13	Define DB2 10 to z/OS, and build cataloged procedures.	DSNTIJMV
14	Define system data sets.	DSNTIJIN
15	Define authorization exit routines.	DSNTIJEX
16	IPL z/OS. <sup>1</sup>	none
17	Start DB2 10.	none
18	Tailor the DB2 10 catalog.	DSNTIJTC
19	Optionally, invoke DSN1CHKR to check for broken links on DB2 10. Optionally, run job DSNTIJCX to check indexes in the catalog and directory.	none
20	Optionally, rebuild indexes that are put in the informational rebuild-pending state during migration to DB2 10.	DSNTIJRI
21	Enable change data capture.	none
22	Prepare the dynamic SQL program and bind the packages for DB2 REXX Language Support. Optionally, create additional table spaces in the work file database.	DSNTIJTM
23	Set up DB2-supplied applications and user-maintained databases.	DSNTIJSG
24	Migrate EXPLAIN tables to Version 10 format and Unicode encoding.	DSNTIJXA, DSNTIJXB, and DSNTIJXC
25	Configure the DB2 environment for running stored procedures and user-defined functions.	none

Table 71. Overview of steps for migrating to DB2 10 conversion mode from Version 8 (continued)

Step	Description	Job
26	Set up DB2-supplied routines.	DSNTIJRW, DSNTIJRT, and DSNTIJRV
27	Verify views.	none
28	Take an image copy of the DB2 10 catalog.	DSNTIJIC
29	Set up the administrative task scheduler.	none
30	Optionally, run select Version 8 verification jobs.	DSNTEJxx
31	Optionally, run RUNSTATS to collect improved statistics.	none

**Note:**

1. Optional if no PARMLIB updates exist and if early code is at the correct level.

**Related concepts:**

Loading the DB2 libraries

Migration to enabling-new-function mode from Version 8: Summary

**Related tasks:**

Premigration checklist for migration to conversion mode from Version 8

Checklist for migration to DB2 10 conversion mode from Version 8

Preparing your system to install or migrate to DB2 10

Tailoring DB2 jobs to your environment using the installation CLIST

Migrating your DB2 subsystem to conversion mode (from Version 8 or Version 9)

## Falling back to Version 8: Summary

*Fallback* is the process of returning to your previous release after successfully completing the catalog migration to DB2 10 conversion mode (from Version 8 or Version 9). A successful migration means that migration job DSNTIJTC completed successfully. You can fall back to Version 8 only if you migrated from Version 8.

You can fall back to Version 8 if a severe error occurs either during the subsequent migration steps or during operation of DB2 10 in conversion mode from Version 8. You cannot fall back from any of the following DB2 10 modes:

- conversion mode\* from Version 8
- enabling-new-function mode from Version 8
- enabling-new-function mode\* from Version 8
- new-function mode

To fall back to Version 8, complete the steps in the following table.

Table 72. Overview of steps to fall back to Version 8

Step	Description	Job
1	Stop DB2 10.	(none)
2	Rename the cataloged procedures.	DSNTIJFV
3	Reconnect TSO, IMS, and CICS to Version 8.	(none)
4	Start Version 8.	(none)
5	Modify your DSNTIJIC job for use during fallback.	(none)

Table 72. Overview of steps to fall back to Version 8 (continued)

Step	Description	Job
6	Run select Version 8 installation verification jobs. These jobs should be the jobs that you ran to verify your migration to conversion mode from Version 8.	DSNTEJxx

**Related concepts:**

Implications of falling back

**Related tasks:**

Falling back to DB2 9

Falling back in a data sharing environment

## Remigration from Version 8: Summary

*Remigration*, which is migration to DB2 10 after falling back to your previous version, is simpler than the initial migration process.

The basic steps for remigrating to DB2 10 from Version 8 are as follows.

Table 73. Overview of steps for remigration to DB2 10

Step	Description	Job
1	Run DSN1COPY with the CHECK option on the catalog table spaces. Invoke DSN1CHKR to check for broken links on your Version 8 system. Run the queries in DSNTESQ to check for consistency between catalog tables.	(none)
2	Take an image copy of your Version 8 catalog.	DSNTIJIC
3	Stop your Version 8 system.	(none)
4	Reconnect TSO, IMS, and CICS to DB2 DB2 10.	(none)
5	Rename cataloged procedures.	DSNTIJFV
6	Start DB2 10.	(none)
7	Optionally, take an image copy of the DB2 10 catalog.	DSNTIJIC
8	Optionally, run select Version 8 verification jobs.	DSNTEJxx

You must perform some additional tasks manually.

**Related tasks:**

Remigrating

## Migration to enabling-new-function mode from Version 8: Summary

After you migrate to DB2 10 conversion mode from Version 8, you must migrate to enabling-new-function mode from Version 8 before you can activate new-function mode.

Migration to enabling-new-function mode from Version 8 includes the steps in the following table.

Table 74. Overview of steps for migrating to DB2 10 enabling-new-function mode from Version 8

Step	Description	Job
1	Run installation CLIST using ENFM option.	(none)
2	Take an image copy of your DB2 10 catalog.	DSNTIJIC
3	Convert the DB2 DB2 10 catalog and directory.	DSNTIJEN
	Optionally, run job DSNTIJNH to stop enabling-new-function mode processing before job DSNTIJEN completes.	

**Related tasks:**

Migrating from conversion mode (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

Completing enabling-new-function mode (from Version 8 or Version 9) processing

## Migration from enabling-new-function mode from Version 8 to new-function mode: Summary

After you migrate to enabling-new-function mode from Version 8, you can migrate to DB2 10 new-function mode.

Migration to DB2 10 new-function mode includes the steps in the following table.

Table 75. Overview of steps for migrating to DB2 10 new-function mode

Step	Description	Job
1	Enter new-function mode.	DSNTIJNF
2	Optionally, check for consistency between catalog tables.	DSNTESQ
3	Optionally, stop DB2 10.	(none)
4	Create the application defaults load module, <i>dsnhdcp</i> , for new-function mode.	DSNTIJNG
5	If you stopped before running DSNTIJNG, start DB2 10.	(none)
6	Create user-managed objects that require new-function mode.	DSNTIJNX
7	Install DB2-supplied routines that require new-function mode.	DSNTIJRT
8	Validate the installation of DB2-supplied routines.	DSNTIJRV
9	Convert remaining EXPLAIN tables to Version 10 format.	DSNTIJXA
10	Run DB2 10 verification jobs.	DSNTEJxx

**Related concepts:**

Implications of migrating to DB2 10 new-function mode

**Related tasks:**

Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode

Converting EXPLAIN tables for migration from DB2 Version 8

## Reversion to conversion mode\* from Version 8: Summary

You can revert to conversion mode\* from Version 8 if you encounter problems after migrating to certain DB2 10 modes.

### About this task

If you encounter problems in any of the following DB2 10 modes, you can revert to conversion mode\* from Version 8 until the problems are resolved:

- enabling-new-function mode from Version 8
- enabling-new-function mode\* from Version 8
- new-function mode

### Procedure

To revert from any of these modes to conversion mode\* from Version 8:

Run job DSNTIJCS.

#### Related tasks:

Reverting to conversion mode\* (from Version 8 or Version 9)

## Reversion to enabling-new-function mode\* from Version 8: Summary

If you want to temporarily prevent the use of new function after you migrate to DB2 10 new-function mode, you can revert to enabling-new-function mode\* from Version 8.

### Procedure

To revert from DB2 10 new-function mode to enabling-new-function mode\* from Version 8:

Run job DSNTIJES.

#### Related tasks:

Reverting to enabling-new-function mode\* (from Version 8 or Version 9)

## Migration from conversion mode\* from Version 8 to enabling-new-function mode from Version 8: Summary

After you revert to DB2 10 conversion mode\* from Version 8, you can migrate to enabling-new-function mode from Version 8.

### About this task

The following table identifies the migration modes that are mentioned in this topic, along with the short names that are used to refer to those modes.

Table 76. Long and short names for migration modes

Short name for migration mode	Long name for migration mode
CM8*	Conversion mode* from Version 8
ENFM8	Enabling-new-function mode from Version 8
ENFM8*	Enabling-new-function mode* from Version 8

Table 76. Long and short names for migration modes (continued)

Short name for migration mode	Long name for migration mode
NFM	New-function mode

## Procedure

To migrate to enabling-new-function mode from Version 8 from CM8\*:

Run job DSNTIJEN.

Whether job DSNTIJEN changes DB2 to ENFM8\* or ENFM8 depends on the state of DB2 before you reverted to CM8\*. If you reverted to CM8\* from NFM or ENFM8\*, job DSNTIJEN changes DB2 to ENFM8\*. If you reverted to CM8\* from ENFM8, job DSNTIJEN changes DB2 to ENFM8.

### Related tasks:

Moving from conversion mode\* (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

## Migration from conversion mode\* from Version 8 to new-function mode: Summary

If your subsystem is in DB2 10 conversion mode\* from Version 8, you can migrate to DB2 10 new-function mode.

### Procedure

To migrate from DB2 10 conversion mode\* from Version 8 to DB2 10 new-function mode:

Run job DSNTIJNF. If enabling-new-function mode from Version 8 processing did not complete when DB2 was previously in enabling-new-function mode from Version 8, DSNTIJNF issues an error that indicates that you need to run DSNTIJEN.

### Related tasks:

Moving from conversion mode\* (from Version 8 or Version 9) to new-function mode

## Migration from enabling-new-function mode\* from Version 8 to new-function mode: Summary

After you revert to DB2 10 enabling-new-function mode\* from Version 8, you can migrate to DB2 10 new-function mode.

### Procedure

To migrate to DB2 10 new-function mode from enabling-new-function mode\* from Version 8:

Run job DSNTIJNF.

### Related tasks:

Migrating from enabling-new-function mode\* (from Version 8 or Version 9) to new-function mode



## Premigration checklist for migration to conversion mode from Version 8

Before you migrate to DB2 10 conversion mode from Version 8, complete the premigration activities to prepare your subsystem.

### Procedure

- \_\_ 1. Complete the following tasks in any order.
  - \_\_ • Ensure that you meet the hardware and software requirements.
  - \_\_ • Plan for storage requirements.
  - \_\_ • Plan for performance.
  - \_\_ • Make adjustments for the following changes in DB2 10:
    - \_\_ – Application and SQL release incompatibilities
    - \_\_ – Utility release incompatibilities
    - \_\_ – Command release incompatibilities
    - \_\_ – Security release incompatibilities
    - \_\_ – Storage release incompatibilities
    - \_\_ – Other release incompatibilities
    - \_\_ – Deprecated function in DB2 10
    - \_\_ – Functions that are no longer supported
- \_\_ 2. Use SMP/E to load the DB2 libraries.
- \_\_ 3. Complete the following tasks in any order.
  - \_\_ • Tailor the installation jobs by running the installation CLIST in migration mode.
  - \_\_ • Run premigration query DSNTIIPM.
  - \_\_ • Ensure that the data sets for your DB2 catalog and directory reside on SMS-managed storage.
  - \_\_ • Examine new or changed DB2I default panel values to ensure that your customized values are still valid.
  - \_\_ • Ensure that sample objects from your Version 8 release are still available.
  - \_\_ • Make a backup copy of the BSDS.
  - \_\_ • Change stored procedures that specify DSNWZPR as the external module name to specify DSNWZP.
- \_\_ 4. Immediately before starting the migration tasks, ensure that no utility jobs are running.

### What to do next

See Checklist for migration to DB2 10 conversion mode from Version 8 for the list of migration tasks to complete after premigration.

## Checklist for migration to DB2 10 conversion mode from Version 8

After you complete the premigration tasks to prepare your Version 8 subsystem, you can continue with migrating to DB2 10 conversion mode from Version 8.

### About this task

Complete these steps in the order that they are listed.

## Procedure

- • Complete premigration activities.
- • Run the link checker on DB2 table spaces.
- • Optional: Determine which packages are invalid after migration.
- • Optional: Check for consistency between catalog tables.
- • Take image copies of the directory and catalog: job DSNTIJIC.
- • Connect DB2 to TSO.
- • Optional: Connect IMS to DB2.
- • Optional: Connect CICS to DB2.
- • Stop your Version 8 subsystem.
- • Optional: Back up your Version 8 volumes.
- • Define DB2 initialization parameters: job DSNTIJUZ.
- • Optional: Establish subsystem security.
- • Define DB2 10 to z/OS, and build cataloged procedures: job DSNTIJMV.
- • Define system data sets: job DSNTIJIN.
- • Optional: Define authorization exit routines: job DSNTIJEX.  
You can skip this step if you did not run job DSNTIJEX for your Version 8 subsystem.
- • Optional: IPL z/OS.  
You can skip this step if no PARMLIB updates exist and your early code is at the correct level.
- • Start DB2 10.
- • Tailor the DB2 10 catalog: job DSNTIJTC.
- • Optional: Check the integrity of the catalog and directory.
- • Optional: Rebuild indexes that are put in the informational rebuild-pending state during migration to DB2 10: job DSNTIJRI.
- • Enable change data capture.
- • Prepare the dynamic SQL program and bind the packages for DB2 REXX Language Support. Optionally, create additional table spaces in the work file database: job DSNTIJTM.
- • Rebind SPUFI packages and packages that are defined by IBM: job DSNTIJSG.
- • Migrate EXPLAIN tables to the current format and encoding type.
- • Configure DB2 for running stored procedures and user-defined functions.
- • Set up supplied routines and supporting objects: jobs DSNTIJRW, DSNTIJRT and DSNTIJRV.
- • Verify views.
- • Take an image copy of the DB2 10 catalog: job DSNTIJIC.
- • Set up the administrative task scheduler.
- • Optional: Run Version 8 verification jobs: jobs DSNTJEXx.
- • Optional: Collect improved statistics.

---

## Introduction to migration from DB2 9

*Migration* is the process of upgrading from one DB2 release to a later release. Migration also refers to the process of changing from one migration mode to the next.

### Important restrictions:

- A data sharing group that is migrated from DB2 9 to DB2 10 cannot have any Version 8 members.
- If you start a DB2 9 subsystem migration to DB2 10, you can fall back to only DB2 9.
- If you start a Version 8 subsystem migration to DB2 10 and then fall back to Version 8, you cannot subsequently migrate the subsystem to DB2 9.

**Related concepts:**

Availability of new functions in conversion mode from Version 9 and new-function mode

## Migration modes for DB2 9 to DB2 10

Migration from DB2 9 to DB2 10 new-function mode includes five migration modes. Four of these modes are differentiated from the modes that are part of migration from Version 8 to DB2 10.

The names of the modes during migration from DB2 9 are:

- Conversion mode from Version 9
- Conversion mode\* from Version 9
- Enabling-new-function mode from Version 9
- Enabling-new-function mode\* from Version 9
- New-function mode

New-function mode is not differentiated by the release from which you are migrating.

Each of the DB2 modes has a corresponding short name that is used in the DB2 output. The short names are also used in some topics to improve readability where multiple mode names are mentioned. The following table shows the short names of the DB2 modes for migration from DB2 9 and the corresponding long names.

*Table 77. Long and short names for migration modes*

Short name for migration mode	Long name for migration mode
CM9	Conversion mode from Version 9
CM9*	Conversion mode* from Version 9
ENFM9	Enabling-new-function mode from Version 9
ENFM9*	Enabling-new-function mode* from Version 9
NFM	New-function mode

To see the current mode of a DB2 subsystem, issue a DISPLAY GROUP command. The output shows the short name for the migration mode. The definition of each mode is as follows:

### Conversion mode from Version 9

The state of the catalog after the DB2 10 migration process is complete. In a DB2 data sharing group, members in CM9 can coexist with members that are still in DB2 9. New DB2 10 functions are not available for use in CM9. A subsystem that is in CM9 can fall back to only DB2 9.

### Conversion mode\* from Version 9

A state that is similar to CM9, but the asterisk (\*) indicates that, at one time, the subsystem or data sharing group was in ENFM9, ENFM9\* or

NFM. You can still access objects that were created in ENFM9 or NFM. Data sharing groups that have a member in this mode cannot have any DB2 9 members. A subsystem that is in CM9\* cannot fall back to DB2 9.

**Enabling-new-function mode from Version 9**

A transitional state that indicates that the DB2 subsystem or data sharing group is in the process of enabling new function. New DB2 10 functions are not available in ENFM9. A subsystem that is in ENFM9 cannot return to CM9, but it can revert to CM9\*. A subsystem that is in ENFM9 also cannot fall back to DB2 9 or coexist with a DB2 9 subsystem.

**Enabling-new-function mode\* from Version 9**

A transitional state that is similar to ENFM9, but the asterisk (\*) indicates that, at one time, the DB2 subsystem or data sharing group was in NFM. In ENFM9\*, you can still access objects that were created in NFM, but you cannot create new objects. A subsystem that is in ENFM9\* can revert to CM9\*, but it cannot fall back to DB2 9 or coexist with a DB2 9 subsystem.

**New-function mode**

The state of the catalog after enabling-new-function mode processing is complete and job DSNTIINF runs successfully. The catalog has been marked as being in new-function mode. All new DB2 10 functions are available in NFM. A subsystem that was migrated to DB2 10 NFM from CM9 can revert to CM9\* or ENFM9\*. However, the subsystem cannot fall back to DB2 9 or coexist with a DB2 9 subsystem.

The process of migrating from DB2 9 to DB2 10 begins with migration to CM9. From there, you can migrate to ENFM9 and then to NFM.

The flow from one migration mode to another is illustrated in the following figure:

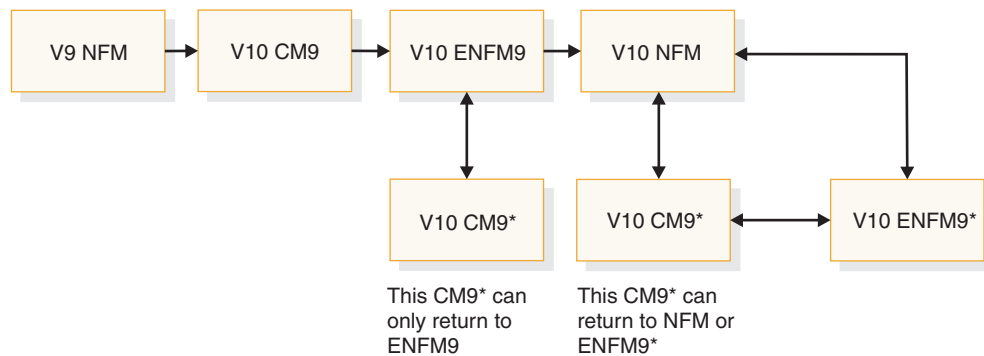


Figure 76. The flow from one mode to another during migration

CM9\* and ENFM9\* are optional modes that you can revert to if you encounter problems in another mode or if you want to temporarily prevent the use of new function.

Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.


### Availability of new function in DB2 10

Generally, new SQL capabilities, including changes to existing functions, statements, and limits, become available only in new-function mode, unless explicitly stated otherwise. Exceptions to this general statement include optimization and virtual storage enhancements, which are also available in conversion mode unless stated otherwise. In DB2 Version 8 and DB2 9, most utility functions were available in conversion mode. However, for DB2 10, most utility functions become available in new-function mode.

#### Related tasks:

Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

#### Related reference:

 -DISPLAY GROUP (DB2) (DB2 Commands)

## Migration to conversion mode from Version 9: Summary

After you load the DB2 libraries and run the installation CLIST, you can migrate your DB2 9 subsystem to DB2 10. When you finish migration, your subsystem is in DB2 10 conversion mode from Version 9.

Migration to conversion mode from Version 9 includes the steps in the following table.

Table 78. Overview of steps for migrating to DB2 10 conversion mode from Version 9

Step	Description	Job
1	Check for changes to DB2 that might impact your migration to DB2 10 conversion mode. Make adjustments for release incompatibilities. Perform premigration activities to determine unsupported objects.	DSNTIJPM
2	Run DSN1COPY with the CHECK option on the catalog table spaces, and invoke DSN1CHKR to check for broken links on your DB2 9 subsystem.	none
3	Optionally, determine which packages will be invalid after migration.	none
4	Optionally, check for consistency between catalog tables.	none
5	Take an image copy of your DB2 9 catalog.	DSNTIJIC
6	Establish the TSO environment for DB2.	DSNTIJVC
7	Optionally, connect DB2 to IMS.	none
8	Optionally, connect CICS to DB2.	none
9	Stop your DB2 9 subsystem.	none
10	Optionally, back up your DB2 9 volumes.	none
11	Define DB2 initialization parameters.	DSNTIJUZ
12	Optionally, establish subsystem security.	none
13	Define DB2 10 to z/OS, and build cataloged procedures.	DSNTIJMV
14	Define system data sets.	DSNTIJIN
15	Define authorization exit routines.	DSNTIJEX
16	IPL z/OS. <sup>1</sup>	none

Table 78. Overview of steps for migrating to DB2 10 conversion mode from Version 9 (continued)

Step	Description	Job
17	Start DB2 10.	none
18	Tailor the DB2 10 catalog.	DSNTIJTC
19	Optionally, invoke DSN1CHKR to check for broken links on DB2 10. Optionally, run job DSNTIJCX to check indexes in the catalog and directory.	none
20	Optionally, rebuild indexes that are put in the informational rebuild-pending state during migration to DB2 10.	DSNTIJRI
21	Enable change data capture.	none
22	Prepare the dynamic SQL program and bind the packages for DB2 REXX Language Support. Optionally, create additional table spaces in the work file database.	DSNTIJTM
23	Set up supplied applications and user-maintained databases.	DSNTIJSG
24	Migrate EXPLAIN tables to Version 10 format and Unicode encoding.	DSNTIJXA, DSNTIJXB, and DSNTIJXC
25	Configure DB2 for running stored procedures and user-defined functions.	none
26	Set up DB2-supplied routines.	DSNTIJRW, DSNTIJRT, and DSNTIJRV
27	Verify views.	none
28	Take an image copy of the DB2 10 catalog.	DSNTIJIC
29	Set up the administrative task scheduler.	none
30	Optionally, run select DB2 9 verification jobs.	DSNTEJxx
31	Optionally, run RUNSTATS to collect improved statistics. You can skip this step if your DB2 9 RUNSTATS procedures included the KEYCARD option.	none

**Note:**

1. Optional if no PARMLIB updates exist and if early code is at the correct level.

**Related concepts:**

Loading the DB2 libraries

Migration to enabling-new-function mode from Version 9: Summary

**Related tasks:**

Premigration checklist for migration to DB2 10 conversion mode from Version 9

Checklist for migration to DB2 10 conversion mode from Version 9

Preparing your system to install or migrate to DB2 10

Tailoring DB2 jobs to your environment using the installation CLIST

Migrating your DB2 subsystem to conversion mode (from Version 8 or Version 9)

## Falling back to DB2 9: Summary

*Fallback* is the process of returning to your previous DB2 release after successfully completing the catalog migration to DB2 10 conversion mode (from Version 8 or

Version 9). A successful migration means that migration job DSNTIJTC completed successfully. You can fall back to DB2 9 only if you migrated from DB2 9.

You can fall back to DB2 9 if a severe error occurs either during the subsequent migration steps or during operation of DB2 10 in conversion mode from Version 9. You cannot fall back from any of the following DB2 10 modes:

- Conversion mode\* from Version 9
- Enabling-new-function mode from Version 9
- Enabling-new-function mode\* from Version 9
- New-function mode

To fall back to DB2 9, complete the steps in the following table.

*Table 79. Overview of steps to fall back to DB2 9*

Step	Description	Job
1	Stop DB2 10.	(none)
2	Rename the cataloged procedures.	DSNTIJFV
3	Reconnect TSO, IMS, and CICS to DB2 9.	(none)
4	Start DB2 9.	(none)
5	Modify your DSNTIJIC job for use during fallback.	(none)
6	Run select DB2 9 installation verification jobs. These jobs should be the jobs that you ran to verify your migration to conversion mode from Version 9.	DSNTEJxx

**Related concepts:**

Implications of falling back

**Related tasks:**

Falling back to DB2 9

Falling back in a data sharing environment

## Remigration from DB2 9: Summary

*Remigration*, which is migration to DB2 10 after falling back to your previous version, is simpler than the initial migration process.

The basic steps for remigrating from DB2 9 are as follows.

*Table 80. Overview of steps for remigration to DB2 10*

Step	Description	Job
1	Run DSN1COPY with the CHECK option on the catalog table spaces. Invoke DSN1CHKR to check for broken links on your DB2 9 system. Run the queries in DSNTEJxx to check for consistency between catalog tables.	(none)
2	Take an image copy of your DB2 9 catalog.	DSNTIJIC
3	Stop your DB2 9 system.	(none)
4	Reconnect TSO, IMS, and CICS to DB2 DB2 10.	(none)
5	Rename cataloged procedures.	DSNTIJFV
6	Start DB2 10.	(none)

Table 80. Overview of steps for remigration to DB2 10 (continued)

Step	Description	Job
7	Optionally, take an image copy of the DB2 10 catalog.	DSNTIJJIC
8	Optionally, run select DB2 9 verification jobs.	DSNTEJxx

You must perform some additional tasks manually.

**Related tasks:**

Remigrating

## Migration to enabling-new-function mode from Version 9: Summary

After you migrate to DB2 10 conversion mode from Version 9, you must migrate to enabling-new-function mode from Version 9 before you can activate new-function mode.

Migration to DB2 10 enabling-new-function mode from Version 9 includes the steps in the following table.

Table 81. Overview of steps for migrating to DB2 10 enabling-new-function mode from Version 9

Step	Description	Job
1	Run installation CLIST using ENFM option.	(none)
2	Take an image copy of your DB2 10 catalog.	DSNTIJJIC
3	Convert the DB2 DB2 10 catalog and directory.  Optionally, run job DSNTIJNH to stop enabling-new-function mode processing before job DSNTIJEN completes.	DSNTIJEN

**Related tasks:**

Migrating from conversion mode (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

Completing enabling-new-function mode (from Version 8 or Version 9) processing

## Migration from enabling-new-function mode from Version 9 to new-function mode: Summary

After you migrate to DB2 10 enabling-new-function mode from Version 9, you can migrate to DB2 10 new-function mode.

Table 82. Overview of steps for migrating to DB2 10 new-function mode

Step	Description	Job
1	Enter new-function mode.	DSNTIJNF
2	Optionally, check for consistency between catalog tables.	DSNTESQ
3	Optionally, stop DB2 10.	(none)
4	Create the application defaults load module, <i>dsnhdcep</i> , for new-function mode.	DSNTIJNG



Table 82. Overview of steps for migrating to DB2 10 new-function mode (continued)

Step	Description	Job
5	If you stopped DB2 before running DSNTIJNG, start DB2 10.	(none)
6	Install supplied routines that require new-function mode.	DSNTIJRT
7	Validate the installation of supplied routines.	DSNTIJRV
8	Run DB2 10 verification jobs.	DSNTEJxx

**Related concepts:**

Implications of migrating to DB2 10 new-function mode

**Related tasks:**

Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode

## Reversion to conversion mode\* from Version 9: Summary

You can revert to conversion mode\* from Version 9 if you encounter problems after migrating to certain DB2 10 modes.

### About this task

If you encounter problems in any of the following DB2 10 modes, you can revert to conversion mode\* from Version 9 until the problems are resolved:

- enabling-new-function mode from Version 9
- enabling-new-function mode\* from Version 9
- new-function mode

### Procedure

To revert from any of these modes to conversion mode\* from Version 9:

Run job DSNTIJCS.

**Related tasks:**

Reverting to conversion mode\* (from Version 8 or Version 9)

## Reversion to enabling-new-function mode\* from Version 9: Summary

If you want to temporarily prevent the use of new function after you migrate to DB2 10 new-function mode, you can revert to enabling-new-function mode\* from Version 9.

### Procedure

To revert from DB2 10 new-function mode to enabling-new-function mode\* from Version 9:

Run job DSNTIJES.

**Related tasks:**

Reverting to enabling-new-function mode\* (from Version 8 or Version 9)

## Migration from conversion mode\* from Version 9 to enabling-new-function mode from Version 9: Summary

After you revert to DB2 10 conversion mode\* from Version 9, you can migrate to DB2 10 enabling-new-function mode from Version 9.

### About this task

The following table identifies the migration modes that are mentioned in this topic, along with the short names that are used to refer to those modes.

Table 83. Long and short names for migration modes

Short name for migration mode	Long name for migration mode
CM9*	Conversion mode* from Version 9
ENFM9	Enabling-new-function mode from Version 9
ENFM9*	Enabling-new-function mode* from Version 9
NFM	New-function mode

### Procedure

To migrate to DB2 10 enabling-new-function mode from Version 9 from CM9\*:

Run job DSNTIJEN.

Whether DSNTIJEN changes DB2 to ENFM9\* or ENFM9 depends on the state of DB2 before you reverted to CM9\*. If you reverted to CM9\* from NFM or ENFM9\*, job DSNTIJEN changes DB2 to ENFM9\*. If you reverted to CM9\* from ENFM9, job DSNTIJEN changes DB2 to ENFM9.

#### Related tasks:

Moving from conversion mode\* (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

## Migration from conversion mode\* from Version 9 to new-function mode: Summary

If your subsystem is in DB2 10 conversion mode\* from Version 9, you can migrate to DB2 10 new-function mode.

### Procedure

To migrate from conversion mode\* from Version 9 to DB2 10 new-function mode:

Run job DSNTIJNF. If enabling-new-function mode from Version 9 processing did not complete when DB2 was previously in enabling-new-function mode from Version 9, DSNTIJNF issues an error that indicates that you need to run DSNTIJEN.

#### Related tasks:

Moving from conversion mode\* (from Version 8 or Version 9) to new-function mode

## Migration from enabling-new-function mode\* from Version 9 to new-function mode: Summary

After you revert to DB2 10 enabling-new-function mode\* from Version 9, you can migrate to DB2 10 new-function mode.

### Procedure

To migrate to DB2 10 new-function mode from enabling-new-function mode\* from Version 9:

Run job DSNTIJNF.

### Related tasks:

Migrating from enabling-new-function mode\* (from Version 8 or Version 9) to new-function mode

## Premigration checklist for migration to DB2 10 conversion mode from Version 9

Before you migrate to DB2 10 conversion mode from Version 9, complete the premigration activities to prepare your subsystem.

### Procedure

- \_\_ 1. Complete the following tasks in any order.
  - \_\_ • Hardware and software requirements for DB2.
  - \_\_ • Storage requirements for DB2.
  - \_\_ • Planning for performance of DB2.
  - \_\_ • Converting EXPLAIN tables for migration from DB2 Version 8.
  - \_\_ • Make adjustments for the following changes in DB2 10:
    - \_\_ – Application and SQL release incompatibilities for migration from DB2 9
    - \_\_ – Utility release incompatibilities for migration from DB2 9
    - \_\_ – Command release incompatibilities for migration from DB2 9
    - \_\_ – Security release incompatibilities for migration from DB2 9
    - \_\_ – Other release incompatibilities for migration from DB2 9
    - \_\_ – Deprecated function in DB2 10 (DB2 for z/OS What's New?)
    - \_\_ – Functions that are no longer supported for systems migrating from DB2 9
- \_\_ 2. Loading the DB2 libraries.
- \_\_ 3. Complete the following tasks in any order.
  - \_\_ • Tailoring DB2 jobs to your environment using the installation CLIST.
  - \_\_ • Run premigration queries (DSNTIJPM).
  - \_\_ • Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS).
  - \_\_ • Examine all new and changed values for DB2I panels.
  - \_\_ • Ensure that sample objects from your previous release are available.
- \_\_ 4. Immediately before starting the migration tasks, Ensure that no utility jobs are running.

## What to do next

See Checklist for migration to DB2 10 conversion mode from Version 9 for the list of migration tasks to complete after premigration.

## Checklist for migration to DB2 10 conversion mode from Version 9

After you complete the premigration tasks to prepare your DB2 9 subsystem, you can continue with migrating to DB2 10 conversion mode from Version 9.

### About this task

Complete these steps in the order that they are listed.

### Procedure

- \_\_\_ • Complete premigration activities.
- \_\_\_ • Run the link checker on DB2 table spaces.
- \_\_\_ • Optional: Determine which packages are invalid after migration.
- \_\_\_ • Optional: Check for consistency between catalog tables.
- \_\_\_ • Take image copies of the directory and catalog: job DSNTIJIC.
- \_\_\_ • Connect DB2 to TSO.
- \_\_\_ • Optional: Connect DB2 to IMS.
- \_\_\_ • Optional: Connect CICS to DB2.
- \_\_\_ • Stop your DB2 9 subsystem.
- \_\_\_ • Optional: Back up your DB2 9 volumes.
- \_\_\_ • Define DB2 initialization parameters: job DSNTIJUZ.
- \_\_\_ • Optional: Establish subsystem security.
- \_\_\_ • Define DB2 10 to z/OS, and build cataloged procedures: job DSNTIJMV.
- \_\_\_ • Define system data sets: job DSNTIJIN.
- \_\_\_ • Optional: Define authorization exit routines: job DSNTIJEX.  
You can skip this step if you did not run job DSNTIJEX for your DB2 9 subsystem.
- \_\_\_ • Optional: IPL z/OS.  
You can skip this step if no PARMLIB updates exist and your early code is at the correct level.
- \_\_\_ • Start DB2 10.
- \_\_\_ • Tailor the DB2 10 catalog: job DSNTIJTC.
- \_\_\_ • Optional: Check the integrity of the catalog and directory.
- \_\_\_ • Optional: Rebuild indexes that are put in the informational rebuild-pending state during migration to DB2 10: job DSNTIJRI.
- \_\_\_ • Enable change data capture.
- \_\_\_ • Prepare the dynamic SQL program and bind the packages for DB2 REXX Language Support. Optionally, create additional table spaces in the work file database: job DSNTIJTM.
- \_\_\_ • Rebind SPUFI packages and packages that are defined by IBM: job DSNTIJSG.
- \_\_\_ • Migrate EXPLAIN tables to the current format and encoding type.
- \_\_\_ • Configure DB2 for running stored procedures and user-defined functions.

- • Set up supplied routines and supported objects: jobs DSNTIJRW, DSNTIJRT and DSNTIJRV.
  - • Verify views.
  - • Take an image copy of the DB2 10 catalog: job DSNTIJIC.
  - • Set up the administrative task scheduler.
  - • Optional: Run DB2 9 verification jobs: jobs DSNTJxx.
  - • Optional: Collect improved statistics.
- You can skip this step if your DB2 9 RUNSTATS procedures included the KEYCARD option.

---

## Migrating your DB2 subsystem to conversion mode (from Version 8 or Version 9)

The first step in migrating your DB2 subsystem is to migrate to DB2 10 conversion mode from Version 8 or to DB2 10 conversion mode from Version 9.

### About this task

**Attention:** If you do not follow the documented procedures, unpredictable results might occur after migration to conversion mode (from Version 8 or Version 9).

Before you migrate to DB2 10 conversion mode (from Version 8 or Version 9), you must have a maintenance level on Version 8 or DB2 9 that contains the fallback SPE, and you must start the subsystem that you are migrating at least once with the fallback SPE applied. If you do not start your Version 8 or DB2 9 subsystem at least once with the fallback SPE applied, your DB2 10 migration process will fail.

**From V8** If you are migrating from Version 8, ensure that the BSDS has been converted to the new format. To convert to the new format, you can use the DSNJCNVB utility. **From V8**

When you start DB2, the code level of the starting DB2 is compared to the code level that is required by the current DB2 catalog. If the starting DB2 has a code-level mismatch with the catalog, DB2 does not start and a message is issued.

Refer to the DB2 Program Directory for keyword specifications that are used for Preventive Service Planning (PSP) and for information about the service levels of any coupling facilities. You can use the z/OS DISPLAY CF command to display the service level of coupling facilities. Check Information/Access or the ServiceLink facility of IBMLink for PSP information before you migrate. Or, to help you identify required service, you can instead use enhanced HOLDDATA and fix categories (FIXCATs), which provide a simplified, automated method of identifying and applying missing PTFs that are required for installation or migration. Also check monthly for current information about DB2.

**Restriction:** After migration to conversion mode (from Version 8 or Version 9), the administrative task scheduler is disabled until you run job DSNTIJRT.



### Related concepts:



**From V8** Migration modes for DB2 Version 8 to DB2 10 **From V8**

**From V9.1** Migration modes for DB2 9 to DB2 10 **From V9.1**

Loading the DB2 libraries

**Related tasks:**

 Premigration Checklist for migration to DB2 10 conversion mode from DB2 9 

 Premigration Checklist for migration to DB2 10 conversion mode from DB2 Version 8 

Running the installation CLIST

## Migration step 1: Actions to complete before migration

Before you migrate to DB2 10 conversion mode (from Version 8 or Version 9), you must prepare your system for migration. Preparations include making adjustments for release compatibilities, running premigration queries, and completing other premigration tasks.

**Related tasks:**



Premigration checklist for migration to DB2 10 conversion mode from Version 8





Premigration checklist for migration to DB2 10 conversion mode from Version 9



### Run premigration queries (DSNTIJPM)

Before you migrate to DB2 10, run premigration queries on the catalog of the Version 8 or DB2 9 subsystem that you are migrating.

#### Procedure

To run premigration queries:

1. Customize job DSNTIJPM as described in the job prolog.
2. Run job DSNTIJPM.

#### Results

Job DSNTIJPM generates reports about conditions that require action before or during the migration process. Such conditions include obsolete object formats, missing required objects, packages that must be rebound before migration, and dependencies that are affected by the migration process. For detailed information about the contents of the reports for migration to DB2 10, see the report descriptions in job DSNTIJPM.

You can find the complete DSNTIJPM job in IBM Knowledge Center.

**Related concepts:**

WLM management of stored procedures


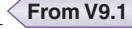
**Related tasks:**

Change stored procedures that specify DSNWZPR as the external module name for migration from Version 8

Converting EXPLAIN tables (before migration)

 Moving from SYSFUN.DSN\_XMLVALIDATE to SYSIBM.DSN\_XMLVALIDATE (DB2 Programming for XML)

 Premigration checklist for migration to DB2 10 conversion mode from DB2 9 

 Premigration checklist for migration to DB2 10 conversion mode from DB2 9.1 

**Related reference:**

The private to DRDA protocol REXX tool (DSNTP2DP)

**Related information:**

 False dependencies on SYSPKAGE because of CGTTs

## Make adjustments for incompatible changes in DB2 10

Some changes in DB2 10 might affect your DB2 operations after migrating.

### Procedure

To prepare for incompatible changes that the DB2 10 release introduces:

- Changes that might affect your migration from Version 8
- Functions that are no longer supported for systems migrating from DB2 9
- Changes that might affect your migration from DB2 9
- Functions that are no longer supported for systems migrating from Version 8
- Deprecated function in DB2 10 (DB2 for z/OS What's New?)

**Related tasks:**



Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8





Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1



## Define the SMS environment for the DB2 catalog and directory data sets (DSNTIJSS)

In DB2 10, data sets that are defined for the DB2 catalog and directory are managed by DB2 and must be SMS-managed.

## About this task

Job DSNTIJSS shows how to create a stand-alone SMS environment for the DB2 catalog and directory data sets. Job DSNTIJSS is designed for use on systems that do not already have a SMS environment, but it can also be used as a reference for adapting an existing one.

You are not required to convert existing data sets to an SMS environment before migrating to DB2 10. These data sets can indefinitely remain non-SMS-managed, but they will be converted to SMS management when the related table space is reorganized.

The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. To define a data class with this attribute, specify EXT in the DATA SET NAME TYPE field of the DATA SET CLASS DEFINE panel of ISMF. Then, ensure that the automatic class selection (ACS) routine associates the DB2 catalog and directory data sets with this data class.

## Procedure

To create the stand-alone SMS environment for the DB2 catalog and directory:

1. Customize job DSNTIJSS according to the directions in the job prolog.
2. Run job DSNTIJSS.
3. To activate the SMS environment, use this z/OS command, where *scds-name* is the name of the SMS source control data set that was specified by DSNTIJSS:  
`SETSMS SCDS(scds-name)`

**Attention:** This command will deactivate any existing SMS environment that is defined from another SCDS.

4. Run the SMS CONVERTV tool with the TEST option to verify that all data sets on target volumes can be placed under SMS management.

Example of running CONVERTV with the TEST option:

```
//CONVRTV EXEC PGM=ADRDUSSU,REGION=5M
//SYSPRINT DD SYSOUT=*
//DD1 DD UNIT=SYSALLDA,VOL=SER=targvo11,DISP=OLD
//DD2 DD UNIT=SYSALLDA,VOL=SER=targvo12,DISP=OLD
//SYSIN DD *
CONVERTV DDNAME(DD1) SMS TEST CATALOG
CONVERTV DDNAME(DD2) SMS TEST CATALOG
/*
```

5. When CONVERTV TEST reports that all data sets on the target volumes can be placed under SMS management, run CONVERTV without the TEST option to convert the data sets. If any data sets cannot be converted, do not run CONVERTV without the TEST option. You must either create additional ACS routines to manage these data sets or move them to different (non-SMS) volumes.

## Related tasks:

 From V8

Premigration checklist for migration to DB2 10 conversion mode from DB2 9

 From V8



From V9.1

Premigration checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

### Examine all new and changed values for DB2I panels

During a migration, the DB2I default panels DSNEOP01 and DSNEOP02 are not initialized with the values that are specified during the installation CLIST process. The DB2I panel variables in the ISPF profile from the previous release are used on the current release. Any customized DSNEPROF members are migrated from your previous release to DB2 10.

#### Procedure

To ensure that your customized values are still valid:

Examine any new or changed DB2I default panel values.

#### Related tasks:

From V8

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8

From V8

From V9.1

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1

From V9.1

### Ensure that sample objects from your previous release are available

If you no longer have the IVP jobs from your previous release, you need to run the previous release's installation CLIST to regenerate them.

#### Procedure

To ensure that sample objects from your previous release are available:

If you dropped your previous release's sample database (by running job DSNTJ0), run the previous release's IVP jobs through phase 3 before you start the migration to conversion mode (from Version 8 or Version 9).

If you do not have the jobs from the previous release available during migration, you will not have a DB2-supported IVP to verify a successful migration to conversion mode (from Version 8 or Version 9).

#### Related tasks:

From V8

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8

From V8

From V9.1

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1

From V9.1

### **Make a backup copy of the BSDS for migration from Version 8**

Because the BSDS is converted in job DSNTIJUZ if you did not convert it in DB2 Version 8, you should make a backup copy of the BSDS before migrating to DB2 10 conversion mode from Version 8.

#### **About this task**

In DB2 10, the BSDS must be in the format that supports up to 10,000 data sets per copy for archive logs and 93 data sets per copy for active logs.

**Related tasks:**

From V8

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8

From V8

### **Change stored procedures that specify DSNWZPR as the external module name for migration from Version 8**

In DB2 Version 8, DSNWZPR was an alias of module DSNWZP. In DB2 10, the DSNWZPR alias has been removed.

#### **Procedure**

To prepare your Version 8 stored procedures:

Change stored procedures that specify DSNWZPR as the external module name to specify DSNWZP.

**Related tasks:**

From V8

Premigration checklist for migration to DB2 10 conversion mode from Version 8

From V8

### **Ensure that no utility jobs are running**

In DB2 10, you can restart or terminate a utility only on the same release on which it was started.

#### **About this task**

Any outstanding utilities prior to DB2 10 cannot be restarted or terminated after you have migrated to DB2 10 conversion mode (from Version 8 or Version 9).

Immediately before you begin the migration process, ensure that you do not have outstanding utility jobs.

## Procedure

To ensure that you do not have outstanding utility jobs:

Issue the DISPLAY UTILITY(\*) command.

### Related tasks:

From V8

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 8

From V8

From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

From V8

From V9.1

Premigration checklist for migration to DB2 Version 10 conversion mode from Version 9.1


From V9.1

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

From V9.1

### Related reference:

 -DISPLAY UTILITY (DB2) (DB2 Commands)

## Migration step 2: Verify the integrity of DB2 table spaces

The link checker utility, DSN1CHKR, verifies the integrity of the DB2 directory and catalog table spaces on the system that you are migrating.

### About this task

**Important:** This migration step identifies data integrity issues that might interfere with subsequent migration tasks.

**Tip:** For best results, use this process to check the DB2 catalog and directory regularly, even outside of the migration process.

## Procedure

To verify the integrity of your DB2 directory and catalog table spaces:

1. Required: **GUIP** Issue the STOP DATABASE command on catalog and directory table spaces that contain links or hashes. These table spaces include:
  - DSNDB06.SYSDBASE
  - DSNDB06.SYSDBAUT
  - DSNDB06.SYSGROUP
  - DSNDB06.SYSPLAN
  - DSNDB06.SYSVIEWS
  - DSNDB01.DBD01

**GUIP**

2. Run DSN1CHKR on these table spaces, in any order. DSN1CHKR scans the specified table space for broken links, hash chains, and orphans (records that are not part of any link or chain).
3. Run the DSN1COPY utility with the CHECK option on all catalog table spaces to ensure that the table space pages are physically correct and that the catalog table spaces are clustered.

When you run this utility on segmented table spaces, you might receive message DSN1985I. The segmented table spaces in the catalog and directory are: DSNDB06.SYSPKAGE, DSNDB06.SYSSTR, DSNDB06.SYSSTATS, DSNDB06.SYSDDF, DSNDB06.SYSOBJ, DSNDB01.SYSUTILX, and DSNDB01.SPT01. You can ignore this message.

4. Run the CHECK INDEX utility.
5. You should run the following query on the catalog tables of the Version 8 or DB2 9 system that you are migrating. If the query returns any rows, the identified STOGROUPs have both specific and non-specific volume IDs. Table spaces in databases that use these STOGROUPs cannot be image copied or recovered until ALTER STOGROUP is used to remove volumes so that the STOGROUP has either specific or non-specific volume IDs.

This query is commented out in the DB2 10 member DSNTESQ of *prefix.SDSNSAMP*.

**GUIP**

```
SELECT * FROM SYSIBM.SYSVOLUMES V1
       WHERE VOLID ^= '*' AND
          EXISTS (SELECT * FROM SYSIBM.SYSVOLUMES V2
                 WHERE V1.SGNAME = V2.SGNAME AND
                       V2.VOLID = '*')
```

**GUIP**

**Related tasks:**

**From V8** Checklist for migration to DB2 Version 10 conversion mode from Version

8 **From V8**

**From V9.1** Checklist for migration to DB2 Version 10 conversion mode from

Version 9.1 **From V9.1**

**Related reference:**

 CHECK INDEX (DB2 Utilities)

 DSN1CHKR (DB2 Utilities)

 DSN1COPY (DB2 Utilities)

**Related information:**

## Migration step 3: Determine which packages are invalid after migration (optional)

Migrating to DB2 10 conversion mode (from Version 8 or Version 9) renders some packages invalid.

### Procedure

To identify which packages are invalid after migration to DB2 10:

Run the following query on the Version 8 or DB2 9 subsystem that you are migrating. This query is commented out in the DB2 10 member DSNTESEQ of *prefix.SDSNSAMP*. You can run this query from SPUFI or from a dynamic SQL program like DSNTEP2.


#### PSPI

```
SELECT DISTINCT COLLID, NAME, VERSION
  FROM SYSIBM.SYSPACKDEP, SYSIBM.SYSPACKAGE
 WHERE BNAME IN
 ('SYSPACKAGE' , 'SYSPLAN' , 'SYSTABLEPART' , 'SYSROUTINES' ,
 'DSNOFX01' , 'DSNOFX02' , 'DSNOFX07' , 'DSNOPX01' ,
 'DSNATX01' , 'DSNADH01' , 'DSNADX01' , 'DSNAGH01' ,
 'DSNAGX01' , 'DSNOAX01' , 'DSNSKX01' , 'DSNSKX02' ,
 'DSNKAX01' , 'DSNKAX02' , 'DSNAPH01' , 'DSNAPX01' ,
 'DSNWCX02' , 'DSNWCX03' , 'DSNAUH01' , 'DSNAUX02'
 )
 AND LOCATION = ' '
 AND BQUALIFIER = 'SYSIBM'
 AND BTYPE IN ('I','T')
 AND COLLID = DCOLLID
 AND NAME = DNAME
 AND CONTOKEN = DCONTOKEN
 ORDER BY COLLID, NAME, VERSION;
```

#### PSPI

If you are not in a data sharing coexistence environment, after migration, you can explicitly rebind these packages or let DB2 rebind them automatically. If you are in a data sharing coexistence environment and the ABIND subsystem parameter is set to COEXIST, rebind these packages before you migrate any members to DB2 10.

#### Related concepts:

 Changes that invalidate packages (DB2 Application programming and SQL)

#### Related tasks:

##### From V8

Checklist for migration to DB2 Version 10 conversion mode from Version 8

##### From V8

##### From V9.1

Checklist for migration to DB2 Version 10 conversion mode from Version 9

##### From V9.1

## Migration step 4: Check for consistency between catalog tables (optional)

The DSNTESQ queries check the logical correctness of the DB2 catalog.

### Before you begin

Before you run these queries, complete Migration step 2: Verify the integrity of DB2 table spaces to run the DSN1CHKR utility, the CHECK INDEX utility, and the DSN1COPY utility with the CHECK option.

### About this task

**Tip:** For best results, use this process to check the DB2 catalog regularly, even outside of the migration process.

### Procedure

To check for consistency between catalog tables:

Run the queries that are not commented out in member DSNTESQ of the *prefix.SDSNSAMP* library. You can execute the SQL statements in DSNTESQ from SPUFI or from a dynamic SQL program like DSNTDP2.

You can run the queries on the actual catalog tables or on “mirror” copies of the catalog tables. If you run the queries on the copies, use the comment lines in member DSNTESQ for guidance. By running queries on copies of the catalog table, you reduce contention on the catalog.

#### Related tasks:

Migration step 2: Verify the integrity of DB2 table spaces

**From V8** ▶ Premigration checklist for migration to DB2 10 conversion mode from DB2 Version 8 ◀ **From V8**

**From V9.1** ▶ Premigration checklist for migration to DB2 10 conversion mode from DB2 9 ◀ **From V9.1**

## Migration step 5: Take image copies of the directory and catalog: DSNTIJIC

For backup purposes, create a copy of the catalog and directory of the system that you are migrating.

### About this task

**Attention:** If you do not create this copy, DB2 can start. However, if errors in the catalog or directory require you to fall back to your previous version, you risk losing some of your tables and data.

### Procedure

To create an image copy of the directory and catalog, perform the following steps with the DB2 9 copy of DSNTIJIC:

1. Examine job DSNTIJIC for the following items, and modify as needed:

- The tape unit name. The job lists the tape unit name as TAPE. If this is incorrect for your site, correct it. The name TAPE is also used as the unit name for the default archive log data sets.
  - Expiration date or retention period. You can add a retention period or an expiration date to the job.
  - The user on the JOB statement. Ensure that the user is authorized. If DB2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.
2. Complete one of the following tasks:

**From V8**

If you are migrating from Version 8, run the Version 8 DSNTIJIC job.

**From V8**

**From V9.1**

If you are migrating from DB2 9, run the DB2 9 DSNTIJIC job.

**From V9.1**

Job DSNTIJIC contains a list of all the DB2 directory and catalog table spaces. When you run DSNTIJIC, it invokes the DB2 image copy utility to copy these table spaces to tape. The copied table spaces allow you to recover the DB2 catalog and directory in case of a failure.

3. If job DSNTIJIC fails or abends, look for problems with the tape that is set up for image copy. If you do not find a problem, examine the log for problems. For example, look for incorrect size or I/O errors.

## What to do next

After migration, periodically run the DB2 10 job DSNTIJIC against the DB2 10 directory and catalog, perhaps daily or weekly. This action reduces the amount of time that is required for recovering the DB2 directory or catalog. The copied data and log data sets are needed for recovery.

If you are remigrating, you need to complete one of the following actions:

- Change the names of the data sets in which the new image copies are to reside. (Migration image copies use the current data set names.)
- Run the MODIFY utility to remove the migration image copies. If you select this option, ensure that you are familiar with the MODIFY utility.

If DSNTIJIC has been modified to copy table spaces to disk instead of tape, the job is limited to two disk volumes. To change the number of disk volumes, the job needs to be modified again, using volume serial numbers instead of `VOL=REF=*.jobstep`.

**Related tasks:**

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

**Related reference:**

 [MODIFY RECOVERY \(DB2 Utilities\)](#)

## Migration step 6: Connect DB2 to TSO

Access to TSO is required to support the interactive component of DB2 (DB2I). Access to TSO also allows batch applications to access DB2 when those batch programs are executed under the TSO terminal monitor program (TMP).

### Procedure

To attach DB2 to TSO:

1. Make DB2 load modules available to TSO and batch users.
2. Make DB2 CLISTs available to TSO and batch users.
3. Make panels, messages, and load modules available to ISPF and TSO.

### What to do next

Save your TSO logon procedures and JCL from your Version 8 or DB2 9 subsystem in case you need to fall back from DB2 10.

**Related tasks:**

From V8

Checklist for migration to DB2 10 conversion mode from Version 8

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

### Make DB2 load modules available to TSO and batch users

To connect DB2 to TSO, you must first make DB2 load modules available to TSO and batch users. If *prefix.SDSNEXIT* and *prefix.SDSNLOAD* are not included in your *LNKLSTxx*, you can skip this step.

### Procedure

To make DB2 load modules available to TSO and batch users:

If you have not included *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in your *LNKLSTxx*, add *JOBLIB* or *STEPLIB* statements to your logon procedures and JCL to ensure that you access the DB2 10 load modules. Include *prefix.SDSNEXIT* before *prefix.SDSNLOAD* in your *JOBLIB* or *STEPLIB* concatenations.



## What to do next

You can attach to multiple releases of DB2 with your existing TSO or CAF logon procedures without changing the load libraries for your applications. After you migrate completely to the latest level of DB2, you must update those procedures and jobs to point to the latest level of DB2 load libraries.

### **Make DB2 CLISTs available to TSO and batch users: DSNTIJVC**

Job DSNTIJVC merges the tailored CLISTs from *prefix.NEW.SDSNTEMP* with unchanged CLISTs from *prefix.SDSNCLST*, and it places all CLISTs in *prefix.NEW.SDSNCLST*.

### **About this task**

Tailoring changes can modify these CLISTs: DSNEMC01, DSNH, DSNU, and DSNHC. The DSNTINST CLIST reads these CLISTs from *prefix.SDSNCLST*, edits them, and places them in *prefix.NEW.SDSNTEMP*. You can modify the default values.

The DSNEMC01 CLIST uses the values that are specified on installation panel DSNTIPF and stores the results in the ISPF profile member DSNEPROF. You can migrate customized DSNEPROF members from Version 8 to DB2 10 conversion mode from Version 8 or from DB2 9 to DB2 10 conversion mode from Version 9. However, you need to examine any new or changed default panel values to ensure that your customized values are still valid.

DSNTIJVC also converts the DB2 CLISTs from a fixed-block record format to a variable-block format, with a record length of 84 and a block size of 3120. A CLIST that has been converted from fixed-block format to variable-block format cannot be used as input to the DSNTINST CLIST; use the unedited version of the SDSNCLST data set, as created by SMP/E.

### **Procedure**

To make the CLISTs available to TSO and batch users:

1. If you use fixed-block CLIST libraries, modify the DSNTIJVC job as follows:
  - Change the SYSIN DD to DUMMY.
  - Change the allocation of *prefix.SDSNCLST* to match the data control block (DCB) attributes of your other CLIST libraries.
2. Run job DSNTIJVC.
3. Either concatenate *prefix.NEW.SDSNCLST* with your existing CLIST libraries or copy *prefix.NEW.SDSNCLST* into an existing CLIST library.

## What to do next

If you need to rerun job DSNTIJVC, first delete data set *prefix.NEW.SDSNCLST*, which is created by this job.

When corrective service is applied to a CLIST, SMP/E changes only the *prefix.SDSNCLST* data set. You need to redo any record format changes and reapply any special tailoring that is required. You also need to move the CLIST to *prefix.NEW.SDSNCLST*. Corrective service (program temporary fixes) for these CLISTs is sent with ++HOLD statements, calling your attention to the possibility of additional work.

### **Related concepts:**

Installation and migration jobs that the CLIST tailors

## Make DB2I panels, messages, and load modules available to ISPF and TSO

During migration, to connect the DB2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

### About this task

DB2I uses the ISPF PROFILE and SHARED variable pools for most panel variable fields. As a result, you can easily re-enter a panel when panel variables have previously been specified. For the DB2 subcommands that permit lists of plan names, package names, DBRMs, and ENABLE and DISABLE statements, DB2I provides ISPF to contain all the user-specified variables for these subcommand keywords.

DB2I creates and maintains a set of ISPF tables in a user-defined TSO data set that is allocated to a data set with a ddname of DSNETBLS. The DB2I-generated tables in this library are DSNCONNS, DSNDBRMS, and DSNPLPKN. The following table shows the library table member names and their contents.

Table 84. The DB2 ISPF table library

DSNCONNS	ENABLE or DISABLE connection type and connection name variables that are referenced by plan or package name
DSNDBRMS	Subcommand DBRM member and LIBRARY name variables that are referenced by plan name
DSNPLPKN	Package list variables that are referenced by package name
DSNPATHS	Schema name variables that are referenced by plan or package name and that are to be included in the PATH keyword

DB2I uses ISPF table services to maintain individual ISPF tables within the DSNETBLS data set. For performance reasons, ISPF keeps this table library in an open state once an individual table has been updated. Attempts to close this data set by using the TSO FREE command results in error message IKJ56861I.

### Procedure

To make panels, messages, and load modules available to ISPF and TSO:

1. If you added the DB2I libraries as part of the step to prepare for running the DB2 installation CLIST, you can skip this step. Otherwise, concatenate the DB2 ISPF libraries with the ISPPLIB, ISPTLIB, ISPSLIB, and ISPMLIB DD statements in your logon procedures. You must also concatenate the DB2 ISPF libraries with these DD statements in any of your CLISTs where the libraries might be allocated. These libraries are *prefix.SDSNSPFP*, *prefix.SDSNSPFM*, *prefix.SDSNSPFS*, and *prefix.SDSNPFPE* or *prefix.SDSNPFPP*. If you use English DB2I panels, concatenate SDSNPFPE to ISPPLIB. If you use Kanji DB2I panels, concatenate SDSNPFPPK instead of SDSNPFPE.

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE
```

2. Create the DSNETBLS data set.

When allocating this data set, you should assign the following DCB attributes, where  $n$  is any integer:

```
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE( $n$ *LRECL)
```

The following example shows how to set up an ALLOCATE statement to create the data set:

```
ALLOC DA(DSNSPFT) NEW SP(1 1) TR DIR(10) +  
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE(800)  
F(DSNETBLS) REUSE
```

The following example shows how to allocate an existing data set to the data set with the DSNETBLS ddname:

```
ALLOC DA(DSNSPFT) F(DSNETBLS) REUSE
```

3. If you want to run the ISPF/CAF sample application that is provided with DB2, ensure that the data set *prefix*.RUNLIB.LOAD is included in the logon procedures or in the ISPLLIB concatenation. If you chose IBMCOB for your LANGUAGE DEFAULT on panel DSNTIPF, you should also include the data set *prefix*.CEE.SCEERUN.

**Related concepts:**

Dynamic SQL and the ISPF/CAF application

**Related tasks:**

Make DB2 load modules available to TSO and batch users

**Related reference:**

 [z/OS ISPF Messages and Codes](#)

## Migration step 7: Connect DB2 to IMS (optional)

Connecting DB2 to IMS is an optional part of migration. Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. Make DB2 load modules available to IMS.
2. Define DB2 to IMS.
3. Define new programs and transactions to IMS.
4. Prepare IMS applications for DB2.
5. Depending on your site, you might also need to:
  - Define DB2 plans for IMS applications.
  - Generate a user language interface.

**Related tasks:**

Connecting the IMS attachment facility

 **From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

 **From V8**

 **From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

## Migration step 8: Connect CICS to DB2 (optional)

To connect DB2 to CICS, you need to disconnect and connect the CICS region.

### About this task

A macro is supplied with CICS to define the connection between CICS and DB2 by using a resource control table (RCT).

Ensure that you coordinate the attachment facility connection with your CICS support group.

### Procedure

To connect the CICS attachment facility:

1. Recalculate space requirements for the CICS attachment facility.
2. Define your CICS attachment facility parameters using the RCT.
3. Update the CICS system tables.
4. Update the CICS initialization JCL.
5. Coordinate DB2 and CICS security if necessary.
6. Prepare new CICS applications for DB2 if necessary.

#### Related tasks:

 Defining the CICS DB2 connection

From V8

Checklist for migration to DB2 10 conversion mode from Version 8

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from Version 9

From V9.1

## Migration step 9: Stop Version 8 or DB2 9 activity

Before making DB2 10 conversion mode (from Version 8 or Version 9) operational, ensure that all work is stopped on the Version 8 or DB2 9 subsystem that you are migrating.

### Before you begin

If you do not stop work on the Version 8 or DB2 9 subsystem or data sharing member that you are migrating, fallback procedures might fail.

### Procedure

To stop work on the system that you are migrating:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for DB2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

The QUIESCE keyword allows DB2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access DB2:

**GUIP**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP**

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct jobs were run for DSNTIJUZ. Ensure that you started DB2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all DB2 9 work is stopped:
  - Make sure no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use `-DSN1 RECOVER INDOUBT` for any indoubt threads.

- All utilities must be restarted or terminated on the version on which they were started. If you do not use data sharing, ensure that all utilities are completed or terminated on your Version 8 or DB2 9 subsystem. To ensure that no utility work remains, issue the following command:

**GUIP**

```
-DSN1 DISPLAY UTILITY(*)
```

**GUIP**

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the DB2 directory (DSNDB01) or the DB2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

**GUIP**

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

**GUIP**

You must have system administrator or system operator authority (specified on installation panel DSN TIP P1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop DB2 by issuing the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

**Related tasks:**

**From V8**

Checklist for migration to DB2 Version 10 conversion mode from Version 8






**From V8**

**From V9.1**

Checklist for migration to DB2 Version 10 conversion mode from Version 9.1

**From V9.1**

**Related reference:**

-  -DISPLAY DATABASE (DB2) (DB2 Commands)
-  -DISPLAY THREAD (DB2) (DB2 Commands)
-  -DISPLAY UTILITY (DB2) (DB2 Commands)
-  -STOP DB2 (DB2) (DB2 Commands)
-  -TERM UTILITY (DB2) (DB2 Commands)

## Migration step 10: Back up your Version 8 or DB2 9 volumes (optional)

After you have stopped Version 8 or DB2 9 activity, back up the Version 8 or DB2 9 subsystem that you are migrating. This backup provides a recovery base in case one becomes necessary.

### Procedure

To back up your subsystem:

Take dumps of the DB2 subsystem data sets. You also can take dumps of the SMP/E data sets and the DB2 distribution and target libraries.

### Related tasks:

From V8

Checklist for migration to DB2 DB2 10 conversion mode from DB2 Version 8

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

## Migration step 11: Define DB2 initialization parameters: DSNTIJUZ

Job DSNTIJUZ generates the DB2 data-only subsystem parameter module DSNZPxxx, the application defaults load module (*dsnhdccp*), and the data-only load module DSNHMCID.

### Before you begin

If the DB2 subsystem that you are migrating has only one bootstrap data set (BSDS), add second BSDS before you migrate. For more information, see Adding a second BSDS.

### About this task

The subsystem parameter module consists of the expansion of six macros that contain the DB2 execution-time parameters that you selected by using the ISPF panels. The names of these macros are DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

### Procedure

To define the DB2 initialization parameters:

1. Save your Version 8 or DB2 9 subsystem parameter module so that it is available in case you need to fall back.
2. Run job DSNTIJUZ.

## Results

The DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

### Related tasks:

#### From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

#### From V8

#### From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

#### From V9.1

## DSNTIJUZ actions

Job DSNTIJUZ defines the DB2 data-only subsystem parameter module DSNZPxxx, the application defaults load module, and the data-only load module DSNHMCID.

Job DSNTIJUZ also completes the following actions:

- 

#### From V8

For migration from Version 8, runs the DSNJCNVB module to convert the BSDS if you did not convert the BSDS in your previous release. The updated format supports up to 10,000 data sets per copy for archive logs and 93 data sets per copy for active logs.

#### From V8

- Assembles and link-edits the application defaults module, *dsnhdecpl*, into the *prefix.SDSNEXIT* library.
- Assembles and link-edits the subsystem parameter module, DSNZPxxx, into the *prefix.SDSNEXIT* library.
- Assembles and link-edits the DSNHMCID data-only module, which is needed for message conversion by DB2 applications and utilities. DSNHMCID is link-edited into both the *prefix.SDSNEXIT* and *prefix.SDSNLOAD* libraries.
- Uses SMP/E in step DSNTIMQ to read in the edited version of DSNTIJUZ and set up GENASM entries for the DB2 application defaults macro and system parameter (DSN6xxxx) macro. This action causes service to any of these macros to trigger SMP/E to initiate a reassembly of the DB2 system parameter module. This job step is optional and commented out. If you want to run it, you need to uncomment it and run it once to feed the appropriate includes and library names to SMP/E.

If DSNHMCID cannot exist in *prefix.SDSNLOAD*, take one of the following actions:

- Include *prefix.SDSNEXIT* ahead of *prefix.SDSNLOAD* in the system link list.
- Include *prefix.SDSNEXIT* ahead of *prefix.SDSNLOAD* in the JOBLIB or STEPLIB statements for all DB2 applications, address space start-up procedures, TSO log-on procedures, CICS tasks, and IMS tasks that use DB2.



Additional steps for DSNTIJUZ are as follows:

1. If you added a STEPLIB DD statement to the DB2 start procedures ahead of *prefix.SDSNEXIT* and *prefix.SDSNLOAD*, you can move the SYSLMOD output to that library.
2. If you changed the prefix for the DB2 distribution libraries, edit DSNTIJUZ to correct the data set names.
3. If you have not run the SMP/E ACCEPT job (DSNACEP1) of FMID HDBAA10, edit DSNTIJUZ so that the SMP/E temporary data set (SMPTLIB) is included in the concatenation for the ADSNLOAD DD statement in step DSNTIZQ. This action ensures that member DSNARIB is linked with the application defaults load module. SMPTLIB is *hlq.HDBAA10.F2*, where *hlq* is from the GLOBAL SMP/E zone. Use the following SMP/E statements to get DSPREFIX:

```
SET BOUNDARY (GLOBAL).  
LIST DDDEF ( SMPTLIB ).
```

Insert the DSPREFIX value after SDSNLOAD and ADSNLOAD. The linkage editor issues a return code of 8, along with message IEW0342 for the following CSECTs:

DSNFSYSP	DSNJARVP	DSNJLOGP	DSNTSPRM
DSNVDIR1	DSNZMSTR	DSN3DIR1	

#### Related reference:

Subsystem parameters that are not on installation panels

### Adding a second BSDS

If you are migrating a DB2 subsystem that has only one bootstrap data set (BSDS), add second BSDS to before you migrate.

#### About this task

A second BSDS simplifies recovery in most situations. With a second BSDS, you can continue working in many cases that otherwise require recovery and restart. The required storage is small, and the data set is relatively inactive.


**Important:** If you do not add a second BSDS, add TW0BSDS=N0 in the DSN6LOGP macro.

#### Procedure

To add a second BSDS, complete the following steps:

1. Run job DSNTIJUZ to set the TW0BSDS=YES parameter in the DSN6LOGP macro. For more information, see .  
You might receive message GIM65001W when you run steps DSNTLOG and DSNTIMQ, or you might receive a return code of 4 when you run step DSNTIMQ. You can ignore these messages.  
If DSNTIJUZ fails or abends, correct the problem and rerun the job, using the same subsystem parameter name.
2. Define a second BSDS. Use the VDSNTISAM BSDS definition in job DSNTIJIN as an example. For more information, see Job DSNTIJIN.
3. Add a //BSDS2 DD statement to the DSN1MSTR DB2 startup procedure.
4. Issue a RECOVER BSDS command to establish the dual BSDS. For more information, see -RECOVER BSDS (DB2) (DB2 Commands).

**Related concepts:**

 [Backup and recovery resources and tools \(Introduction to DB2 for z/OS\)](#)

**Related tasks:**

Migration step 11: Define DB2 initialization parameters: DSNTIJUZ

**Related information:**

 [Using Access Method Services \(DFSMS Access Method Services for Catalogs\)](#)

## Migration step 12: Establish subsystem security (optional)

DB2 lets you control access to data within DB2. DB2 also works together with outside security systems, such as RACF, that control access to the DB2 subsystem.

### About this task


Because your DB2 10 subsystem reuses the data objects from the Version 8 or DB2 9 subsystem that you are migrating, you have probably already supplied the protection that those objects need. However, you probably want to protect the new (DB2 10) DB2 data objects.

### Procedure

To establish subsystem security:

1. Customize job DSNTIJRA, as described in the job prolog.
2. Run job DSNTIJRA. Job DSNTIJRA defines the administrative task scheduler started task module to RACF program control and defines the administrative task scheduler as a trusted context in RACF. DSNTIJRA is intended for the site security administrator, and can be run any time prior to installing or migrating to DB2 10.
3. If you have a DB2 data sharing environment, customize and run DSNTIJRA for each member of the group.

**Related concepts:**

 [Getting started with DB2 security \(Managing Security\)](#)

**Related tasks:**

 **From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

 **From V8**

 **From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9.1

 **From V9.1**

## Migration step 13: Define DB2 10 to z/OS: DSNTIJMV

Job DSNTIJMV completes some of the steps that are required to identify DB2 to z/OS, including updating members of SYS1.PARMLIB and SYS1.PROCLIB.

## Before you begin

Ensure that you completed the task in Make DB2 load modules available to TSO and batch users.

## About this task

DSNTIJMV renames your Version 8 or DB2 9 procedures so that they do not conflict with DB2 10 procedures, which replace your old procedures. The job also creates Language Environment options data sets for the DB2 core WLM environment for Java routines.

## Procedure

To define DB2 10 to z/OS:

1. Run job DSNTIJMV. If job DSNTIJMV runs successfully, it produces return codes of 0. Because a rename can fail without setting the return code, verify all renames.
2. Review the content of the Language Environment options data set and adjust the following environment variables as needed. The data set is created by DSNTIJMV and must be allocated by the JAVAENV DD of the address space procedure for the DB2 core WLM environment for Java routines.
  - `_CEE_ENVFILE`, if present, needs to be set to the name and path of the environment variable file that was created by job step DSNTIJR.
  - `JVMPROPS` needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
  - `DB2_BASE` and `JCC_HOME` need to be set to the names of the HFS directories that you selected for the DB2 for z/OS and JCC product classes.
- 3.

### From V9.1

If you are migrating from DB2 9, review the content of the environment variable file that was created by job step DSNTIJR. Adjust the following information as needed:

- `CLASSPATH` needs to specify the path for the Java class that contains the JAR files for z/OS XML System Services XML schema registration (`/usr/include/java_classes`). `CLASSPATH` cannot specify `gxljapi.jar` or `gxljosrglmp.jar`
- `LIBPATH` needs to specify the path for the native library for z/OS XML System Services (`libGXLNVBAT.so`).
- `STEPLIB` needs to specify the name of the DB2 for z/OS run time library.

### From V9.1

## What to do next

Because different sites have different requirements for identifying DB2 to z/OS, DSNTIJMV cannot anticipate all the necessary updates. For this reason, the updates that job DSNTIJMV makes in `SYS1.PARMLIB` and `SYS1.PROCLIB` are incomplete. You might have additional procedures of your own to rename, or you might have to provide procedures for both releases, using alias names to indicate the current release. If you changed the DB2 subsystem name, the names of the DB2 address space startup procedures also change. If you made any changes to your

Version 8 or DB2 9 procedures (such as data set names), make similar changes to the DB2 10 procedures. You can complete these updates either by making the updates directly in SYS1.PARMLIB and SYS1.PROCLIB or by editing DSNTIJMV.

**Recommendation:** For SYS1.PROCLIB, submit the procedure-update section of DSNTIJMV as necessary. However, before you make the updates, read the information about DSNTIJMV, and examine DSNTIJMV to study the updates that it makes. Edit the updates directly in SYS1.PARMLIB instead of submitting the updates in the DSNTIJMV job.

Before starting DB2, check the private area sizes in the SYS1.PROCLIB update section to ensure that you have enough user private area.


Also, examine the size of the private area on the DB2 startup procedures. If necessary, modify them to satisfy the requirements for EDM pool size, buffers, numbers of open data sets, and the amount of available private address space.

**From V9.1**

If you are migrating from DB2 9, the installation CLIST removes the \_CEE\_ENVFILE environment variable from the Language Environment options data set. This action allows the data set to maintain compatibility with the DB2 9 run time environment for the SYSPROC.XSR\_COMPLETE stored procedure. After you migrate to new-function mode, you must add the \_CEE\_ENVFILE environment variable as part of enabling the DB2 10 run time environment, as explained in “Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode” on page 700

**From V9.1**

**Related concepts:**

 Runtime environment for Java routines (DB2 Application Programming for Java)

**Related tasks:**

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

**From V8**

**From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9

**From V9.1**

**DSNTIJMV actions**

Job DSNTIJMV updates SYS1.PARMLIB and SYS1.PROCLIB to help identify DB2 to z/OS. It also creates Language Environment options data sets for the DB2 core WLM environment for Java routines.

Job DSNTIJMV completes the following actions:

1. Updates the following SYS1.PARMLIB members:

IEFSSNxx

This member contains an entry for every z/OS subsystem. Unless you change the DB2 subsystem name or the DB2 command prefix, you do not need to change this member. If you change the subsystem name or the command prefix, either change the current member or create a new member.

Place the primary system's record (JES2 or JES3) record as the first line in an IEFSSNxx member. However, if you use SMS, place the SMS line before the primary system. There might also be other products that change position during system initialization. The DB2 line should come after SMS, the JES subsystem, and other vendor products.

#### **IEAAPFxx or PROGxx**

This member is updated to include the DB2 program libraries (*prefix.SDSNEXIT*, *prefix.SDSNLOAD*, *prefix.SDXRRESL*, and *prefix.SDSNLINK*) as libraries that are authorized by using the authorized program facility (APF).

*prefix.SDSNLINK* does not need to be included in the list of APF-authorized libraries unless LNKAUTH=APFTAB is set.

All libraries that are concatenated with *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in STEPLIB and JOBLIB statements must be APF-authorized.

#### **LNKLSTxx**

This member is updated to include the DB2 load module library, *prefix.SDSNLINK*, in the LNKLSTxx. If you moved the modules from *prefix.SDSNLINK* into another library, edit DSNTIJMV to include that library in the LNKLSTxx. If you have combined *prefix.SDSNLINK* and *prefix.SDSNLOAD* into one library, edit DSNTIJMV to include the combined library in the LNKLSTxx.

#### **Tip:**

You can do additional editing for the SYS1.PARMLIB updates. If you are editing DSNTIJMV rather than making the changes directly, you have a choice: You can either include your additional entries for the SYS1.PARMLIB members (IEAAPFxx and LNKLSTxx) at the end of the existing list of entries, or you can place them earlier in the list.

If you include these entries at the end of the existing SYS1.PARMLIB list, ensure that commas (the continuation character) delimit each entry except the last entry.

ECSA size is another SYS1.PARMLIB change to consider at this time. You specify ECSA size in the CSA parameter of the IEASYS00 parameter. Ensure that you have specified an adequate size for this subsystem.

2. Renames your Version 8 or DB2 9 procedures so that they are not replaced by DB2 10 procedures.
3. Updates SYS1.PROCLIB to include the following DB2 10 procedures, where *ssnm* is the subsystem name:
  - System services address space startup procedure (*ssnm*MSTR)
  - Database services address space startup procedure (*ssnm*DBM1)
  - Distributed data facility address space startup procedure (*ssnm*DIST)


- Address space startup procedures for the DB2 core WLM environments (*ssnmWLM1*, *ssnmWLMC*, *ssnmWLMD*, *ssnmWLMG*, *ssnmWLMJ*, *ssnmWLMM*, *ssnmWLMP*, *ssnmWLMR*, *ssnmWLMU*, *ssnmWLMW*, and *ssnmWLMX*)
- WLM sample procedure for stored procedures
- IRLM address space startup procedure (IRLMPROC)
- Program preparation procedures
- Utilities procedure (DSNUPROC)

If you specified a suffix on panel DSNTIPA1, that suffix is appended to data sets *&USER..DBRMLIB.DATA.suffix*, *&USER..RUNLIB.LOAD.suffix*, and *&USER..SRCLIB.DATA.suffix*. To override these data set names, edit the updates to SYS1.PROCLIB.


The STEPLIB concatenation of the *ssnmDBM1* address space procedure includes a commented-out DD for the IBM Language Environment data set SCEERUN. If your system does not include SCEERUN in the system link list, you must uncomment this DD. Also, if your system link list does not include the Language Environment data set SCEERUN2, you must add it to the STEPLIB concatenation of your *ssnmDBM1* address space procedure.

4. Creates a Language Environment options data set for the DB2 core WLM environment for Java routines. The data set is created by job step DSNTIJJ and is allocated by the JAVAENV DD of the *ssnmWLMJ* address space procedure that is created by job step DSNTIPM.
5. Defines an environment variable file for the DB2 core WLM environment for Java routines. This step is completed by job step DSNTIJR. The file that is created in this step is referenced by the Language Environment options data set that is created by job step DSNTJJ.
6. Defines a sample JVM startup options file for the DB2 core WLM environment for Java routines. This step is completed by job step DSNTIJS. The file that is created in this step is referenced by the Language Environment options data set that is created by job step DSNTIJJ.

#### Related concepts:

 [How DB2 assigns I/O priorities \(DB2 Performance\)](#)

[Language Environment options data sets for the DB2 core Java WLM environment](#)

 [Runtime environment for Java routines \(DB2 Application Programming for Java\)](#)

## Migration step 14: Define system data sets: DSNTIJIN

When job DSNTIJIN is tailored for migration, it defines the following non-VSAM data sets: *prefix.SRCLIB.DATA*, *prefix.RUNLIB.LOAD*, and *prefix.DBRMLIB.DATA*.

### About this task

#### From V8

If you are migrating from Version 8, the installation CLIST adds job step DSNTASKL to job DSNTIJIN. This job step checks for the administrative task scheduler task list data set and defines it if it is not present.

#### From V8

When job DSNTIJIN is tailored for migration, it does not define data sets for new DB2 catalog and directory table spaces and indexes. Catalog and directory data sets are automatically defined by DB2 when you run job DSNTIJTC to tailor the catalog and job DSNTIJEN to enable new-function mode.

When migrating to DB2 10, do not use DSNTIJIN or any other job to define data sets for the DB2 catalog and directory.

## Procedure

To define *prefix*.SRCLIB.DATA, *prefix*.RUNLIB.LOAD, and *prefix*.DBRMLIB.DATA:

Run job DSNTIJIN.

### Related tasks:

From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

## Migration step 15: Define user authorization exit routines: DSNTIJEX (optional)

You can use job DSNTIJEX to define user authorization exit routines. If you did not run job DSNTIJEX in the release from which you are migrating, you can skip this step.

### About this task

Job DSNTIJEX builds sample authorization exit routines from the source code in *prefix*.SDSNSAMP. These sample authorization exit routines are DSN3@SGN and DSN3@ATH, and the user version of the access control authorization exit routine DSNX@XAC. DSNTIJEX then places the exit routines in the *prefix*.SDSNEXIT library.

Job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. You can modify the access control authorization exit routine DSNX@XAC and use DSNTIJEX to assemble and link-edit it. This exit routine allows you to bypass some or most of DB2 authorization checking and to specify your own authorization checking. The DB2 CLIST tailors the JCL in DSNTIJEX to meet the requirements of your site.

The sample authorization exit routines are not the same as the default authorization exit routines that are supplied by DB2. By implementing the sample authorization exit routines, you can provide group names as secondary authorization IDs.

You have the following options regarding exit routines:

- To use the default authorizations, skip job DSNTIJEX.
- To use the sample authorization exit routines, run job DSNTIJEX.
- To use your own authorization exit routines, modify job DSNTIJEX to reference the correct library, and then run it.

## Procedure

If you choose to run job DSNTIJEX:

1. Make the following optional adjustments to DSNTIJEX if they apply to your site:
  - DSNXSXAC is a copy of the default access control authorization exit routine that you can modify. This exit routine allows you to bypass some or most of DB2 authorization checking and to specify your own authorization checking. If you do not change the exit routine, you should delete this step.
  - DSNACICS is a stored procedure that invokes user exit routine DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. If you do not need to modify the caller's parameter values, you can use the default DSNACICX exit routine. However, if you need to modify the caller's parameter values, you need to perform the following tasks:
    - a. Write a user exit routine in assembler, COBOL, C, or PL/I
    - b. Assemble or compile the source code
    - c. Link-edit the object code into the DB2 exit routine library



Installation job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX. You can use this step as a model for your program preparation job.

- If you will use the RACF/DB2 external security module (DSNXRXAC) as your DB2 access control authorization exit, modify job DSNTIJEX to refer to DSNRXAC instead of DSNXSXAC.
2. Run job DSNTIJEX.
 

If job DSNTIJEX runs successfully, it produces a return code of 0 or 4.

If job DSNTIJEX fails or abends, correct the problem, and rerun the job.

### Related concepts:

-  Access control authorization exit routine (Managing Security)
-  DB2 data access control (Managing Security)

### Related tasks:

 From V8

Checklist for migration to DB2 10 conversion mode from Version 8


 From V8

 From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9

 From V9.1

### Related information:

-  Exit routines (DB2 Administration Guide)



## Migration step 16: IPL z/OS

When you migrate to DB2 10 conversion mode (from Version 8 or Version 9), you should complete the z/OS initial program load (IPL) before you start the DB2 subsystem.

### Before you begin

Alternatively, you can use the SETSSI, SETPROG APF, and SETPROG LNKLST commands to define the subsystem to z/OS until the next IPL.

You should complete the IPL before or during migration, but IPLs are not necessary for fallback or remigration. Before you begin the IPL for z/OS, ensure that job DSNTIJMV was run.

Job DSNTIJMV makes the following changes to the SYS1.PARMLIB library:

- Creates new subsystem definitions in the IEFSSNxx member
- Creates new APF libraries in the IEAAPFxx member
- Creates new load module libraries in the LNKLSTxx member

### About this task

The load module library SDSNLINK contains the early code. If all of the required maintenance has been applied to your system, the early code is upward compatible with DB2 10. Ensure that the early code pre-conditioning PTFs have been installed on your system before you migrate. The DB2 10 early code is downward compatible with Version 8 or DB2 9. The DB2 10 early code is incompatible with DB2 Version 7.

### Procedure

To IPL z/OS:

If you are at the appropriate service level for Version 8 or DB2 9, you can plan ahead, do PARMLIB updates (which are necessary at least to update the APF authorization list), and complete the IPL for z/OS whenever convenient, before you begin your migration. Otherwise, IPL z/OS before you start DB2 10.

### Results

After you complete the IPL for z/OS, message DSN3100I is displayed on the z/OS console, stating that DB2 is ready for the START command.

#### Related tasks:

Migration step 13: Define DB2 10 to z/OS: DSNTIJMV

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

**From V8**

**From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9.1

**From V9.1**

**Related reference:**

- ➔ z/OS SETPROG Command (MVS System Commands)
- ➔ z/OS SETSSI Command (MVS System Commands)

## Migration step 17: Start DB2 10

During migration to DB2 10, start the DB2 subsystem after you run job DSNTIJMV and IPL z/OS.

### Procedure

To start DB2:

1. Start the IRLM. If you have not requested that DB2 automatically start the IRLM, you should start it before you start DB2. Use the following command, where *irlmproc* is the name that you assigned to the IRLM startup procedure:  

```
START irlmproc
```

The *irlmproc* is the value that you specified for the PROC NAME option on installation panel DSNTIPI.

If you specified YES for the AUTO START option on installation panel DSNTIPI, DB2 starts the IRLM automatically.

2. Start DB2 from the z/OS console with the following command, where *-DSN1* is the subsystem command prefix that you defined for DB2, and *DSNZPxxx* is the name of the DB2 initialization parameter module:  

```
-DSN1 START DB2 PARM(DSNZPxxx)
```

If you omit the PARM parameter, and you specified a value in the PARAMETER MODULE field on installation panel DSNTIPO3, that value is used as the parameter module name. If you did not specify a parameter module on panel DSNTIPO3, DB2 uses the default, DSNZPARM.

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, possibly *ssnmDIST*, possibly *ssnmADMT*, and *irlmproc*, where *ssnm* is the DB2 subsystem name, *ssnmADMT* is the DB2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

In the next migration step, you migrate the DB2 catalog. Before the catalog is migrated, some catalog or directory table spaces are restricted.

The following messages might occur during startup of DB2 because the catalog and directory table spaces are restricted:

- DSNT501I with reason code 00C900A6
- DSNL700I with reason code 00C900A6 (if DDF is auto-started)
- Abend 04E with reason code 00E70014 (during DDL registration)

These restrictions can cause failure of processes that are started as part of normal DB2 startup, such as collection of real-time statistics, until catalog tailoring is completed. Possible actions to restart such processes are explained in the discussion of job DSNTIJTC.

You can determine existing restrictions by issuing this command after you start DB2:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

The preceding command might also generate message DSNT501I with reason code 00C900A6.

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the correct job was run for DSNTIJUZ. Also, check that the subsystem parameter member that you specified (or used by default) when you started DB2 is the one that the DSNTIJUZ job built. Check the JCL for the DB2 startup procedure.

3. If you want to use the TSO SUBMIT command to do housekeeping and migration verification, start TSO (if it is not already started).
4. If you did not enable primary user IDs to issue DB2 commands from the z/OS console or TSO SDSF when you first installed the subsystem, take one of the following actions:
  - Grant SYSOPR authority to all primary user IDs that issue DB2 commands from the z/OS console or TSO SDSF. Issue the following command:  

```
GRANT SYSOPR TO userid
```
  - Define RACF classes to authorize DB2 commands. Use the following statements:  

```
SETR CLASSACT(DSNADM)  
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)  
SETR RACLIST(DSNADM) REFRESH  
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)  
SETR RACLIST(DSNADM) REFRESH
```

#### Related tasks:

**From V8**

Checklist for migration to DB2 Version 10 conversion mode from Version 8

**From V8**

**From V9.1**

Checklist for migration to DB2 Version 10 conversion mode from Version 9.1

**From V9.1**

## Migration step 18: Tailor DB2 10 catalog: DSNTIJTC

Job DSNTIJTC invokes the CATMAINT utility to migrate the catalog of the DB2 9 to the DB2 10 catalog.

### Before you begin

You must have appropriate authority to complete this task. For details, see .

Starting in DB2 10, data sets for the DB2 catalog and directory are managed by DB2 and must be SMS-managed. The SMS environment that you use for DB2 catalog and directory data sets must be established before you begin installation or migration to DB2 10. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing DB2 catalog and directory data sets to the SMS environment before migrating to DB2 10. These data sets will be converted the next time the related table space is reorganized.

In a data sharing environment, do not run DSNTIJTC after installing non-originating members.

## About this task

DSNTIJTC contains one step that creates new catalog and directory objects, adds columns to existing catalog tables, and creates and updates indexes on the catalog tables to accommodate new DB2 10 objects. All IBM-supplied indexes are created or updated sequentially during the execution of DSNTIJTC.

## Procedure

To complete the tailoring of the DB2 catalog:

1. Run job DSNTIJTC on your DB2 10 subsystem.

A status message, DSNU777I, is issued at several points to indicate migration progress. Diagnostic error messages are issued when CATMAINT processing fails. If a problem is found during the SQL processing phase of migration, message DSNU778I is issued. If non-supported functions are encountered, message DSNU776I is issued. All of these messages are written to the SYSPRINT data set.

If you receive abend reason code 00C200EF, the catalog and directory data sets are not in a compliant SMS environment.
2. If job DSNTIJTC fails, save the output and correct the problem.
  - a. Terminate the CATMAINT utility if it is pending.
  - b. Run job DSNTIJTC again without modification.
3. If job DSNTIJTC fails again, return to your previous DB2 release. Because CATMAINT failures roll back all DB2 10 changes, the catalog and directory are in the format of your previous DB2 release. Altered indexes are not rolled back. Determine if any index is in a pending status by using the CHECK INDEX utility. To return to your previous DB2 release:
  - a. Rename procedures to use the libraries of your previous release.
  - b. Reconnect TSO, IMS, and CICS to the libraries of your previous release.
4. If your previous release is damaged, you need to complete a point-in-time recovery to recover the system. To complete a point-in-time recovery:
  - a. Restore your previous version's catalog and directory from image copies.
  - b. Restore the BSDSs from archive logs that were made prior to migration.
  - c. Flush the SCA (for data sharing environments only).
  - d. Recover the catalog and directory indexes.

When you remigrate to DB2 10, run the DSNTIJTC job again.

## Results

When you start DB2 10 for the first time, you might receive message DSNT501I with reason code 00C900A6. You can ignore this message. Running job DSNTIJTC corrects the cause of this message.

### From V8

After CATMAINT has run successfully and module DSNICUBC issues message DSNT501I, you can restart your real-time statistics collection by stopping and starting the DSNRTSDB database. In a data sharing group, migrate all members to DB2 10 before stopping and starting the DSNRTSDB database.

### From V8

#### Related concepts:

[DB2 catalog restructured \(DB2 for z/OS What's New?\)](#)

[Work file database storage requirements](#)

[Recovery of data to a prior point in time \(DB2 Administration Guide\)](#)

#### Related tasks:

[Falling back to DB2 9](#)

### From V8

[Checklist for migration to DB2 10 conversion mode from DB2 9](#)

### From V8

### From V9.1

[Checklist for migration to DB2 10 conversion mode from DB2 9.1](#)

### From V9.1

#### Related reference:

[Catalog changes in DB2 10 \(DB2 for z/OS What's New?\)](#)

[CATMAINT \(DB2 Utilities\)](#)

#### Related information:

[DSNU776I \(DB2 Messages\)](#)

[DSNU777I \(DB2 Messages\)](#)

[DSNU778I \(DB2 Messages\)](#)

## Migration step 19: Ensure that the catalog has no problems (optional)

After you tailor your DB2 10 for z/OS catalog, you should check the integrity of your catalog and directory.

### Procedure

To check the integrity of your catalog and directory, complete these steps in any order:

- Run CHECK INDEX on all the indexes in the catalog and directory by using job DSNTIJCX.
- Run the link checker (DSN1CHKR) to ensure that no existing links are broken.
- Run the queries in member DSNTESQ of *prefix.SDSNSAMP*. Because SPUI is not yet bound, you cannot use SPUI to run these queries.

**From V8**

If you are migrating from Version 8, you can use the Version 8 DSNTPE2 program to run the queries.

**From V8**

**From V9.1**

If you are migrating from DB2 9, you can use the DB2 9 DSNTPE2 program to run the queries.

**From V9.1**

- Run the DSN1COPY utility with the CHECK option on the catalog table spaces.

**Related tasks:**

Migration step 2: Verify the integrity of DB2 table spaces

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 9

**From V8**

**From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9.1

**From V9.1**

**Related reference:**

 [DSN1COPY \(DB2 Utilities\)](#)

## Migration step 20: Rebuild indexes: DSNTIJRI (optional)

During migration to DB2 10, some indexes are put in the advisory rebuild-pending state when columns are added to the index.

**From V8**

If you are migrating from Version 8, the following indexes might be affected:

- DSNADX01
- DSNAGX01
- DSNAPX01
- DSNATX01
- DSNAUX02
- DSNKAX01
- DSNKAX02
- DSNOAX01
- DSNOFX01
- DSNOFX02

- DSNOFX07
- DSNSKX01
- DSNWCX02
- DSNWCX03
- DSNXRX01

From V8

From V9.1

If you are migrating from DB2 9, the following index might be affected:

- DSNXRX01

From V9.1

To rebuild these indexes, run job DSNTIJRI.

**Related tasks:**

From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

From V9.1

## Migration step 21: Enable change data capture

During migration to DB2 10 conversion mode (from Version 8 or Version 9), DB2 disables change data capture on the catalog tables. If you want to use change data capture on these tables, you must re-enable it.

### About this task

During enabling-new-function mode (from Version 8 or Version 9) processing, change data capture is disabled on catalog tables. Do not re-enable change data capture until your DB2 subsystem is in DB2 10 new-function mode.

### Procedure

To re-enable change data capture:

Issue the following statement for each table for which you want to re-enable change data capture:

GUPI

```
ALTER TABLE SYSIBM.tablename DATA CAPTURE CHANGES;
```

Where *tablename* is the name of the catalog table.

## GUPI

### Related tasks:

#### From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

#### From V8

#### From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

#### From V9.1

### Related reference:

 ALTER TABLE (DB2 SQL)

## Migration step 22: Prepare dynamic SQL program: DSNTIJTM

Job DSNTIJTM assembles, link-edits, binds, and runs DSNTIAD, a program that processes certain SQL statements dynamically.

### Procedure

To prepare the dynamic SQL program:

1. Determine whether a BIND PLAN statement is needed for DB2 REXX Language Support. DSNTIJTM enables DB2 REXX Language Support for use by DSNTWFG, a REXX program called by DSNTIJTM to create table spaces in the work file database. For migration, the CLIST removes the BIND PLAN statement for DB2 REXX Language Support because it is assumed that the REXX plan was created in a previous release. If the REXX plan was not created in a previous release, you need to add a command like the following after the bind statements for the DB2 REXX Language Support package:

```
  BIND PLAN(DSNREXX) -  
  PKLIST(*.DSNREXX.DSNREXX, -  
  *.DSNREXUR.DSNREXX, -  
  *.DSNREXCS.DSNREXX, -  
  *.DSNREXRS.DSNREXX, -  
  *.DSNREXRR.DSNREXX) -  
  ACT(REP) ISO(CS) SQLRULES(DB2) -  
  ENCODING(EBCDIC)
```
2. Review and possibly modify or delete the GRANT statements in job DSNTIJTM. This job grants PUBLIC access to a number of DB2-supplied objects. Consider granting execute access on the plan to PUBLIC.
3. Run job DSNTIJTM.

### Results

In DB2 versions prior to DB2 9, DSNTIJTM created work file table spaces only for the initial installation. In DB2 9 and later, DSNTIJTM optionally creates additional table spaces in the work file database.

If you do not have an existing 32 KB work file table space, be sure to create at least one during migration.



## Related tasks:

### From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

### From V8

### From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

### From V9.1

## Migration step 23: Bind SPUFI and DCLGEN and user-maintained database activity: DSNTIJSJG

Use job DSNTIJSJG to bind packages for SPUFI, DCLGEN, and the EXEC SQL utility.

### About this task

In migration mode, DSNTIJSJG completes the following actions:

- Binds packages at the new release level for SPUFI, DCLGEN, and the EXEC SQL utility.

### From V8

If you are migrating from Version 8, packages for SPUFI are not bound by this job, except for package DSNESPUR. When this job binds package DSNESPUR, it receives SQLCODE -4700 because XML schema support is not available until new-function mode. Job DSNTIJSJG contains the SQLERROR(CONTINUE) BIND option to handle the expected error, which does not impact SPUFI functionality during conversion mode from Version 8. When you migrate to new-function mode, you must run job DSNTIJSJX to bind all SPUFI packages.

### From V8

- Creates a new resource limit facility table, DSNRLMT $nn$ , and a new resource limit facility index, DSNMRL $nn$ . By default, the step that creates this new table and index is commented out in the JCL. To have DB2 create DSNRLMT $nn$  and DSNMRL $nn$ , uncomment the step.

### From V8

If you are migrating from Version 8, DSNTIJSJF, the last step of DSNTIJSJG, frees an obsolete plan and package named DSNHYCRD. You can expect this step to end with return code 12 if the DSNHYCRD package or plan is not present.

### From V8

### Procedure

To bind the SPUFI, DCLGEN, and the EXEC SQL packages for DB2 10, complete the following steps:

1. If you bound special SPUFI packages and plans in Version 8 or DB2 9, you need to bind those packages again in DB2 10. You do not need to bind those plans again. For example, to update special SPUFI packages that were created for use by SPUFI users who require a TSO terminal CCSID of 1047, issue the following commands.

**From V8**

If you are migrating from Version 8, expect SQLCODE -4700 when you bind from the DSNESM68 (SPUFI) DBRM because XML schema support is not available until new-function mode. Add the SQLERROR(CONTINUE) option to the BIND statements for these packages to handle the expected error, which does not impact SPUFI functionality during conversion mode from Version 8.

**From V8**

**GUIP**

```
BIND PACKAGE(TIAP1047) MEMBER(DSNTIAP) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(SPCS1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(SPRR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(RR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')
```

**GUIP**

- 2.

**From V8**

Beginning in DB2 9, SPUFI provides an option to select data with a cursor isolation level of Uncommitted Read. To add a special package and plan with ISO(UR) for SPUFI users who require a TSO terminal of CCSID 1047, issue the following commands:

If you are migrating from Version 8, expect SQLCODE -4700 when you bind from the DSNESM68 (SPUFI) DBRM because XML schema support is not available until new-function mode. Add the SQLERROR(CONTINUE) option to the BIND statement for this package to handle the expected error, which does not impact SPUFI functionality during conversion mode from Version 8..

**GUIP**

```
BIND PACKAGE(SPUR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(UR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PLAN(SPUR1047) -  
  PKLIST(*.SPUR1047.DSNESM68, -  
  *.TIAP1047.DSNTIAP) -  
  ISOLATION(UR) ENCODING(1047) ACTION(REPLACE)
```

**GUIP**

**From V8**

3. If you are using a data sharing environment, you must ensure that the resource limit facility (RLF) is inactive on all members in the data sharing group before running DSNTIJSJG. To do this, issue the STOP RLIMIT command for each member.
4. Ensure that all your subsystems have the same maintenance level for your DSNUGSQL DBRM.
5. Run job DSNTIJSJG, If DSNTIJSJG runs successfully, it produces a return code of 0. However, job step DSNTIJSJG can produce a return code of 4 if the specified access has already been granted on one or more objects.

**From V8**

Also, if you are migrating from Version 8, job step DSNTIJSJF can end with return code 8 if the package and plan for DSNHYCRD does not exist.

**From V8**

DB2 issues a bind warning for each plan. Expect the following messages:

```
DSNE932I WARNING, ONLY IBM-SUPPLIED PLAN NAMES SHOULD BEGIN WITH DSN
DSNE932I WARNING, ONLY IBM-SUPPLIED PACKAGE-IDS SHOULD BEGIN WITH DSN
DSNE932I WARNING, ONLY IBM-SUPPLIED COLLECTION-IDS SHOULD BEGIN WITH DSN
```

6. If job DSNTIJSJG fails or abends, ensure that the user that is specified on the JOB statement is authorized. Use the name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1. (The RESTART parameter on the JOB statement can be useful.) Correct any other problems, and run job DSNTIJSJG again.
7. If you encounter resource shortages, review the parameters in job DSNTIJSJZ and make any necessary modifications. Then, stop DB2, rerun DSNTIJSJZ, start DB2, and rerun DSNTIJSJG from the last successful step.

## What to do next

**Recommendation:** Alter your DB2 10 buffer pools that have frequent page reads or frequent page writes to use PGFIX YES if you have sufficient real storage available for these buffer pools. Fixing the buffer pages in real storage once and keeping them fixed avoids the processing time that DB2 needs to fix and free pages each time there is an I/O. In some cases, this processing time can be as much as 10% for I/O-intensive workloads. To use this option, issue the following command:

**GUPI**

```
ALTER BPOOL(bpname) VPSIZE(vpsize) PGFIX(YES)
```

**GUPI**

Where *bpname* is the name of the buffer pool and *vpsize* is the size of the virtual pool.

**Related tasks:**

Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode

Special packages and plans for SPUFI

From V8

Checklist for migration to DB2 10 conversion mode from DB2 9

From V8

From V9.1

Checklist for migration to DB2 10 conversion mode from DB2 9.1

From V9.1

## Migration step 24: Convert EXPLAIN tables to the current format and encoding type

When you migrate to DB2 10, you should convert your EXPLAIN tables to the current (DB2 10) format and Unicode encoding.

A table that is not in the current format has fewer columns than are available in the current release, or it has columns that have a different length or data type than expected in the current release. Unicode EXPLAIN tables are preferred because the DB2 catalog tables are encoded in Unicode.

### About this task

Starting in DB2 DB2 10 conversion mode (from both Version 8 and Version 9), EXPLAIN tables must be in Version 8 or later format and preferably encoded in Unicode. DB2 returns SQLCODE -20008 reason code 2 for statements or commands that invoke EXPLAIN processing if the EXPLAIN tables are in a pre-Version 8 format. Statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Version 8 or DB2 9 format, regardless of the encoding type. After you convert your EXPLAIN tables to Version 10 format, you must also convert the tables to Unicode encoding. If an EXPLAIN table is in Version 10 format and encoded in EBCDIC, SQLCODE -878 is returned.

### Procedure

To convert EXPLAIN tables:

1. If premigration job DSNTIIPM report 15 identifies any EXPLAIN tables that are not in DB2 10 format, customize job DSNTIJXA. To customize the job, provide the creator ID of the tables to migrate to the DB2 10 format, a DB2 subsystem name, and an authorization ID. To migrate all EXPLAIN tables, specify an asterisk as the creator ID.

GUPI

GUPI

From V8

The DB2 10 format of the DSN\_STATEMENT\_CACHE\_TABLE EXPLAIN table is not supported in conversion mode from Version 8. If you run DSNTIJXA in conversion mode from Version 8, this table is converted to DB2 9 format.

**From V8**

Also, if you ran installation job DSNTIJSJ, applied the PTF for APAR PM28500, and then ran DSNTIJXA, the DSN\_PROFILE\_TABLE and DSN\_PROFILE\_HISTORY tables contain a downlevel IPADDR column name. This occurs because renaming of columns is not supported in conversion mode from Version 8.

To convert these tables to DB2 10 format, you must run DSNTIJXA again in new-function mode. You can also choose to skip running DSNTIJXA in conversion mode from Version 8 and just run it once in new-function mode. If you choose to run DSNTIJXA once in new-function mode, stop this procedure here.

2. Run job DSNTIJXA.

Job DSNTIJXA calls REXX exec DSNTXTA, which alters to the DB2 10 format all EXPLAIN tables or EXPLAIN tables that belong to the specified creator ID.

**Exception:**

**From V8**

In conversion mode from Version 8, DSNTIJXA cannot convert DSN\_QUERY\_TABLE and DSN\_PTASK\_TABLE from the Version 8 format. Use job DSNTIJXB to convert these tables instead.

**From V8**

3. If premigration job DSNTIJPB report 14 identifies any EXPLAIN tables that use EBCDIC encoding, convert them to Unicode by completing the following steps.

a. Customize job DSNTIJXB with the following values:

- A DB2 subsystem name
- An authorization ID
- The schema name of the EXPLAIN tables to convert
- The name of the target database
- The name of the target 4 KB page table space
- The name of the target 8 KB page table space
- The name of the target 16 KB page table space
- The name of the target 8 KB page LOB table space
- The name of the target 32 KB page LOB table space

b. Run job DSNTIJXB. Job DSNTIJXB calls REXX exec DSNTXTB, which generates DB2 cross-loader control statements and equivalent SQL statements that can be used to copy all EBCDIC EXPLAIN tables under a specified creator ID to Unicode equivalents. All EXPLAIN tables that belong to the specified creator ID must be in the current release format except for DSN\_QUERY\_TABLE, which can be in Version 8 format.

c. If you have purchased the DB2 Utilities Suite, run job DSNTIJXC to process the control statements that were generated by DSNTIJXB. Otherwise, use the equivalent SQL statements that were generated by DSNTIJXB to convert the tables to Unicode.

d. After you convert an EXPLAIN table from EBCDIC encoding to Unicode encoding, check for joins to that table. When you convert EXPLAIN tables to Unicode, applications that join with EXPLAIN tables might have different

results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide).

- e. Repeat steps a, b, c, and d for each creator that has at least one EBCDIC EXPLAIN table.

**Related tasks:**

**From V8**

Checklist for migration to DB2 Version 10 conversion mode from Version 8

**From V8**

**From V9.1**

Checklist for migration to DB2 Version 10 conversion mode from Version 9.1

**From V9.1**

**Related reference:**

 EXPLAIN tables (DB2 Performance)

 EXPLAIN table changes in DB2 10 (DB2 for z/OS What's New?)

## Migration step 25: Configure DB2 for running stored procedures and user-defined functions (optional)


This step needs to be performed during installation, and is therefore optional for migration. Before you can use user-defined functions or the following types of stored procedures, you need to perform some set-up tasks:

- External stored procedures
- External SQL procedures
- Native SQL procedures that satisfy at least one of the following conditions:
  - The native SQL procedure calls at least one external stored procedure, external SQL procedure, or user-defined function.
  - The native SQL procedure is defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE.
- DB2-supplied stored procedures

All routines, except native SQL procedures, must run in an environment that is established by the z/OS Workload Manager (WLM). A set of DB2-supplied routines are installed by job DSNTIJRT and validated by job DSNTIJRV as part of the migration process. You can also define your own routines or use routines that are provided by a non-IBM vendor. Before you can use any stored procedures and user-defined functions, however, you need to set up WLM environments for these routines. If you plan to use certain DB2-supplied stored procedures or user-defined functions, you need to perform some additional steps.

**Related concepts:**

 Stored procedures (DB2 Application programming and SQL)

 User-defined functions (DB2 SQL)

**Related tasks:**

**From V8** Checklist for migration to DB2 10 conversion mode from Version 8

**From V8**

**From V9.1** Checklist for migration to DB2 10 conversion mode from Version 9

**From V9.1**

## Tailoring DB2 subsystem parameters for stored procedures during migration (optional)

Several subsystem parameters should be tailored to your DB2 environment before you use stored procedures. These parameters were set when you installed or migrated DB2. If you are satisfied with those values, you do not need to complete this step.

### About this task

The subsystem parameters for stored procedures are:

- MAX\_NUM\_CUR
- MAX\_ST\_PROC
- STORMXAB
- STORTIME

### Procedure

To modify the values of these subsystem parameters, complete one of the following tasks:

- Run the installation CLIST again in INSTALL or MIGRATE mode. On the installation panels, leave most of the existing values and change the following fields on their respective panels:
  1. On panel DSNTIPA1, specify the input member that contains field values for your current installation.
  2. On panel DSNTIPT, specify different names for the TEMP CLIST LIBRARY and SAMPLE LIBRARY fields to avoid overwriting your original libraries.
  3. On panel DSNTIPX, add or change the values of the MAX ABEND COUNT, TIMEOUT VALUE, MAX OPEN CURSORS, and MAX STORED PROCS fields as appropriate.
  4. On panel DSNTIPY, specify a name for the REMOTE LOCATION field. DB2 uses this name for the stored procedure sample applications.
- Edit job DSNTIJUZ to add or change values for the subsystem parameters for routines.

This method has the following disadvantages:

- DB2 does not use these new values for any future migrations because your DSNTIDxx member and DSNTIJUZ parameters are not saved for future input.
- DB2 does not generate the sample jobs for stored procedure and user-defined functions because you are not running the DSNTINST CLIST.

### Related reference:

DSNTIPA1: Main panel

DSNTIPT: Data set names panel 1

DSNTIPX: Routine parameters panel

DSNTIPY: Job editing panel

Directory of subsystem parameters, panel fields, and application default values

## Setting up Language Environment for stored procedures during migration

*Language Environment* (LE) is a component of the z/OS operating system that establishes a common run time environment for all applications, regardless of programming language. DB2 uses Language Environment to provide a run time environment for external stored procedures and external SQL procedures.

### About this task

Language Environment provides a set of essential run time services that are available through a set of interfaces that are consistent across programming languages. These services include routines for run time message handling, condition handling, and storage management.

Language Environment provides the following advantages for DB2 stored procedures:

- Language Environment hides the differences between programming languages.
- Language Environment provides the ability to make a stored procedure resident in the stored procedure address spaces.
- Language Environment supports a large number of run time options, including those options that are needed to use tools to debug your stored procedures.

### Procedure

To set up Language Environment for stored procedures:

1. Customize Language Environment by completing the instructions in z/OS Language Environment Customization.
2. Specify the Language Environment run time library in the JCL startup procedure for each WLM-managed address space for stored procedures. This library must be the only available run time library. Do not reference any other language run time libraries within the system link list or within the STEPLIB statements. If other language run time libraries are defined in the system link list, use STEPLIB statement overrides to exclude them.


Multiple languages can share the same Language Environment run time library. Therefore, you do not need to specify the language-specific libraries in the JCL startup procedure of each stored procedure address space.

**Restriction:** Do not use compilers (or associated run time libraries) that are no longer supported by IBM.

### What to do next

After you set up Language Environment for stored procedures, you can override the Language Environment run time options for individual stored procedures. You can do this by using the RUN OPTIONS clause in the CREATE PROCEDURE statement or ALTER PROCEDURE statement. The default values for Language Environment run time options are defined by z/OS. You might have overridden some of these default values when you customized Language Environment.

#### Related concepts:

-  External stored procedures (DB2 Application programming and SQL)
-  SQL procedures (DB2 Application programming and SQL)



🔗 Language Environment setup (DB2 for z/OS Stored Procedures: Through the CALL and beyond)

**Related reference:**

🔗 CREATE PROCEDURE (external) (DB2 SQL)

🔗 CREATE PROCEDURE (SQL - external) (DB2 SQL)

🔗 Customizing Language Environment run-time options (z/OS Language Environment Customization)

## Implementing RRS for stored procedures during migration

To use some DB2 stored procedures, you must implement Resource Recovery Services (RRS). RRS is a sync point manager program that coordinates two-phase commit processing. DB2 requires that RRS be active because WLM-managed stored procedure address spaces use the RRS attachment facility (RRSAF).

### About this task

RRS records events for protected resources in log streams that are managed by a z/OS component called the system logger. The following table identifies the log streams that RRS uses, where *gname* can be your Sysplex name or any name in a non-Sysplex environment:

*Table 85. Log streams that RRS uses*

Log stream type	Log stream name	Content
Main unit-of-recovery log state stream	ATR. <i>gname</i> .MAIN.UR	The state of active units of recover (URs). RRS periodically moves this information into the RRS delayed UR state log when UR completion is delayed.
Delayed unit-of-recovery log state stream	ATR. <i>gname</i> .DELAYED.UR	The state of active URs, when UR completion is delayed.
Resource manager data log stream	ATR. <i>gname</i> .RM.DATA	Information about the resource managers that use RRS services.
Restart log stream	ATR. <i>gname</i> .RESTART	Information, which is needed during restart, about incomplete URs. This information enables a functioning RRS instance to assume remaining incomplete work from an RRS instance that failed.
Archive log stream	ATR. <i>gname</i> .ARCHIVE	Information about completed URs. This log stream is optional, but recommended.

All of these log streams are required except for the archive log stream. RRS does not start if it is not able to connect to the required log streams.

In a Sysplex environment, these log streams are shared by the systems of the Sysplex.

## Procedure

To implement RRS for stored procedures:

1. Define the RRS log streams that are to be written, either on disk or in the coupling facility by completing the following actions:
  - a. If you are using the coupling facility, add definitions for the RRS structures in the CFRM policy.

When you use coupling facility log streams, each log stream needs to be mapped to a coupling facility structure.

**Example:** The following example shows JCL that updates the CFRM policy to add the RRS structures:

```
//DEFCFRM1 JOB MSGCLASS=X,TIME=10,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//SYSIN DD *
    DATA TYPE(CFRM) REPORT(YES)
    DEFINE POLICY NAME(CFRM18) REPLACE(YES)
    CF NAME(CF01)
        TYPE(009672)
        MFG(IBM)
        PLANT(02)
        SEQUENCE(000000040104)
        PARTITION(1)
        CPCID(00)
        DUMPSPACE(2048)
        CF NAME(CF02)
        TYPE(009672)
        MFG(IBM)
        PLANT(02)
    .....
    .....
    .....
    STRUCTURE NAME(RRS_ARCHIVE_1)
        INITSIZE(8000)
        SIZE(16000)
        PREFLIST(CF1,CF2)
        REBUILDPERCENT(5)
    STRUCTURE NAME(RRS_RMDATA_1)
        INITSIZE(8000)
        SIZE(16000)
        PREFLIST(CF1,CF2)
        REBUILDPERCENT(5)
    STRUCTURE NAME(RRS_MAINUR_1)
        INITSIZE(8000)
        SIZE(16000)
        PREFLIST(CF1,CF2)
        REBUILDPERCENT(5)
    STRUCTURE NAME(RRS_DELAYEDUR_1)
        INITSIZE(8000)
        SIZE(16000)
        PREFLIST(CF1,CF2)
        REBUILDPERCENT(5)
    STRUCTURE NAME(RRS_RESTART_1)
        INITSIZE(8000)
        SIZE(16000)
        PREFLIST(CF1,CF2)
        REBUILDPERCENT(5)
```

- b. Define the log streams in the system logger policy by using the IXCMIAPU utility. This utility program is provided in the SYS1.MIGLIB system library.

If you are using the coupling facility, also define the structures in the system logger policy. You can map each log stream to a single structure or you can map log streams of like data types to the same structure.

**Example of defining coupling facility log streams:** The following example JCL shows definitions for coupling facility structures and RRS log streams. In this case, each RRS log stream is mapped to a structure.

```
//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(LOGR) REPORT(YES)

    DEFINE STRUCTURE NAME(RRS_ARCHIVE_1) LOGSNUM(1)
        MAXBUFSIZE(64000) AVGBUFSIZE(262)

    DEFINE STRUCTURE NAME(RRS_RMDATA_1) LOGSNUM(1)
        MAXBUFSIZE(1024) AVGBUFSIZE(252)

    DEFINE STRUCTURE NAME(RRS_MAINUR_1) LOGSNUM(1)
        MAXBUFSIZE(64000) AVGBUFSIZE(158)

    DEFINE STRUCTURE NAME(RRS_DELAYEDUR_1) LOGSNUM(1)
        MAXBUFSIZE(64000) AVGBUFSIZE(158)

    DEFINE STRUCTURE NAME(RRS_RESTART_1) LOGSNUM(1)
        MAXBUFSIZE(64000) AVGBUFSIZE(158)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.ARCHIVE) STRUCTNAME(RRS_ARCHIVE_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RM.DATA) STRUCTNAME(RRS_RMDATA_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.MAIN.UR) STRUCTNAME(RRS_MAINUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.DELAYED.UR) STRUCTNAME(RRS_DELAYEDUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RESTART) STRUCTNAME(RRS_RESTART_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)
/*
```

**Example of defining disk log streams:** The following example JCL shows definitions for RRS log streams on disk.

```

/DEFSTREXECPGM=IXCMIAPU
//SYSPRINT DDSYSOUT=A
//SYSINDD *
  DATA TYPE(LOGR)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.MAIN.UR)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(1024)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(1024)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.DELAYED.UR)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(960)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(960)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.ARCHIVE)
    LOWOFFLOAD(0)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(960)
    LS_DATACLAS(VSAMLS)
    AUTODELETE(YES)
    RETPD(2)
    STG_SIZE(2000)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.RM.DATA)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(192)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(192)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.RESTART)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(960)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(960)

```

- c. If you are using coupling facility log streams, compile and link-edit the changed CFRM policy.
- d. If you are using coupling facility log streams, activate the updated CFRM policy in your Sysplex by using the following operator command:

```
SETXCF START,POLICY,TYPE=CFRM,POLNAME=polname
```

- 2. Establish the priority for RSS within the WLM policy.  
The RRS priority needs to be equal to or higher than the dispatching priority of DB2. You can use the SYSSTC service class for the RRS address space to achieve a higher dispatching priority.
- 3. Move the ATRRRS procedure that is supplied by IBM from SYS1.SAMPLIB to your SYS1.PROCLIB as member RRS, and make any necessary changes. This JCL procedure is used to start RRS.

You can use a member name other than RRS, but the first four characters of this name must match the subsystem name that you specify in the IEFSSNxx member of SYS1.PARMLIB in the next step.

The GNAME value in the procedure must match the *gname* that you specified when defining the log streams. The default value for *gname* at RRS startup is the Sysplex name.

**Example:** The following example shows a sample procedure to start RRS.

```
//RRS PROC GNAME='',CTMEM=''
//RRS EXEC PGM=ATRIMIKE,REGION=0M,TIME=NOLIMIT,
//      PARM='GNAME=&GNAME CTMEM=&CTMEM'
//
```

4. Define RRS as a subsystem to z/OS by editing the active IEFSSNxx member of SYS1.PARMLIB to include the following entry:

```
SUBSYS SUBNAME(RRS) /* RESOURCE RECOVERY SERVICES */
```

The subsystem name can be RRS or any other name that you choose. However, the first four characters (or fewer characters if the name is shorter) must match the name of the JCL procedure to start RRS.

5. Start RRS by using the following operator command:

```
START RRS
```

If you subsequently need to stop RRS, use one of the following operator commands:

- SETRRS CANCEL
- SETRRS SHUTDOWN

If neither of these commands stops RRS, use the FORCE RRS,ARM command. In this command, RRS is the subsystem name that your installation assigned to RRS in PARMLIB member IEFSSNxx.

#### **Related concepts:**

[RRSAF \(DB2 for z/OS Stored Procedures: Through the CALL and beyond\)](#)

#### **Related reference:**

[z/OS MVS Programming: Resource Recovery](#)

[Configuring and defining RRS logging requirements \(z/OS MVS Programming: Resource Recovery\)](#)

[Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

## **Setting up a WLM application environment for stored procedures during migration**

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

### **About this task**

If you use data sharing, see “Special considerations for WLM-managed stored procedures in coexistence” on page 749 for additional guidance about setting up WLM environments.

For DB2-supplied routines, you can use the provided definitions for core WLM environments as a starting point for defining your environments. You can use job DSNTIJRW to define and activate these core environments. For more information on using job DSNTIJRW, see Setting up the DB2 core WLM environments during installation. Job DSNTIJMV adds to SYS1.PROCLIB the startup address space procedures for the core WLM environments.

**Recommendation:** Use partitioned data set extended (PDSE) for load libraries that contain external modules for stored procedures. Using PDSEs might eliminate your need to stop and start the stored procedures address space due to growth of the load libraries. If a load library grows from additions or replacements, the library might need to be extended.

## Procedure

To set up a WLM application environment for one or more stored procedures:

1. Gather requirements for the WLM environment. These requirements include:
  - The name of the DB2 subsystem or data sharing group where the stored procedure or user-defined function is to run.
  - The maximum number of task control blocks (TCBs) that can run concurrently in an address space that is initiated by the WLM environment. This setting, referred to as the NUMTCB, is the maximum number of procedures or functions that should run concurrently in that WLM-managed address space. The appropriate setting depends on the requirements or limitations of the individual stored procedure or user-defined function.
    - For recommended NUMTCB values for DB2-supplied stored procedures, see “Installation information for procedures and functions that are supplied with DB2” on page 877.
    - For recommended NUMTCB values for your own stored procedures, see Assigning stored procedures and functions to WLM application environments (DB2 Performance). If a routine allocates a large amount of memory or if the external module for the routine is not re-entrant, the NUMTCB value should be 1. If there is a need for serialization, the NUMTCB value should also be 1.
    - The WLM environment for a REXX stored procedure must have a NUMTCB setting of 1.
  - Requirements for Authorized Program Facility (APF).
    - Stored procedures and user-defined functions that execute privileged instructions (for example, WLM\_REFRESH) must run in a WLM environment that has an APF-authorized address space.
    - DB2 REXX stored procedures, such as DSNTPSMP, and other routines that use TSO/E and REXX facilities must run in a WLM environment that does not have an APF-authorized address space.
    - Most stored procedures can run in a WLM environment that either has or does not have an APF-authorized address space. However, running a routine in an APF-authorized environment is recommended only when doing so is necessary.
  - Special data sets and DD names that are needed by the stored procedure or user-defined function. For example, all Java stored procedures implicitly require a Language Environment run time options data set to be allocated to DD name JAVAENV. Other routines might also have an explicit requirement for a work file to be allocated to a particular DD name.
2. Create a JCL startup procedure for the WLM application environment.

Use *ssnm*WLM (where *ssnm* is the DB2 subsystem ID) as the basis for creating the new startup procedure. *ssnm*WLM is the default name of the sample JCL procedure for starting WLM-established address spaces. If you specified a name in the WLM PROC NAME field on the DSNTIPX installation panel, the sample procedure has that specified name. The sample procedure is placed in your system PROCLIB by installation job DSNTIJMV. For the DSNACICS stored procedure, DSNTIJMV also provides sample procedure *ssnm*CICS, where *ssnm* is the subsystem ID. Tailor your new startup procedure as follows:

- Change the APPLENV value to the name of the WLM application environment that you plan to define.
- Change the startup procedure name to an appropriate procedure name.

**Recommendation:** Specify the same name for the application environment name and the procedure name. Using the same name simplifies monitoring the WLM environment definitions.

- Change the value of DB2SSN to your DB2 subsystem name.
- Ensure that the NUMTCB value is appropriate. If the minimum number of address spaces is specified, the NUMTCB value will be the number of task control blocks that are started in an address space.

**Recommendation:** If you want to be able to easily change the NUMTCB value, specify the NUMTCB value here, and do not specify this parameter on the application environment definition panel when you define the WLM application environment. Specifying NUMTCB on the environment definition panel associates this parameter with the WLM application environment definition. Any changes to the JCL startup procedure can be made by refreshing the WLM application environment. However, changes to the WLM application environment require that you reinstall the z/OS service policy at an LPAR or sysplex level. If you specify the NUMTCB parameter for both the WLM application environment and the startup procedure, the value in the WLM application environment overrides the value in the startup procedure.

- If the environment is one in which the cost of starting new address spaces is very high, you can use the MNSPAS parameter. The MNSPAS parameter specifies the minimum number of address spaces that are to be started and maintained. The value can be 0 through 50. The default value is 0, which means that no minimum number of address spaces is specified. If the number of address spaces is at the specified minimum, cancelling an address space causes WLM to start another one to maintain the minimum. If you refresh a WLM environment, WLM starts a number of new address spaces as needed (or the specified minimum number) and stops the old address spaces.

If the MNSPAS parameter is specified, the NUMTCB value is the number of task control blocks that are started in an address space. If the MNSPAS parameter is not specified, the NUMTCB value is the maximum number of task control blocks that can be started in an address space.

- Edit the data set names to match your data set names.
- Ensure that the library in which the stored procedure resides is in the STEPLIB concatenation.
- Ensure that the IBM Language Environment run time library is specified in the STEPLIB concatenation, unless your system includes the Language Environment run time library in the system link list.

- If you want to run the stored procedure in a WLM environment that has an APF-authorized address space, ensure that all the libraries in the STEPLIB concatenation are defined to the Authorized Program Facility.
- Add any special DD statements that are required for the stored procedures or user-defined functions that are to run in the WLM environment.
  - If you plan to use stored procedures that use the ODBA interface to access IMS databases, make the following additional changes:
    - Add the data set name of the IMS data set that contains the ODBA callable interface code to the end of the STEPLIB concatenation. The name of this data set is usually IMS.RESLIB.
    - After the STEPLIB DD statement, add a DFSRESLB DD statement that names the IMS data set that contains the ODBA callable interface code.
  - If your routines are defined as PROGRAM TYPE SUB and use UNIX System Services (USS) syscall statements, you might need to add a NOUNDUB DD statement. By default, the USS process and its resources are cleaned up after every stored procedure and user-defined function invocation. If you need the task in this WLM environment to retain the process across subsequent invocations, add a dummy NOUNDUB DD statement. This option specifies that no cleanup will occur unless the WLM environment is refreshed. To enable this option, add the following statement to the WLM stored procedure address space startup JCL:

```
//NOUNDUB DD DUMMY
```

Use this option with caution because routines use the USS process that was used by the previous routine that was run under the same task. Also note that any open resources such as file descriptors remain open for the next routine that is run under the same task. Consider using this option on new workloads only if reusing the USS process is the desired behavior.

**Example of a startup procedure:** The following example shows a startup procedure for a WLM application environment for external SQL, COBOL, C, C++, PL/I, and assembler stored procedures. This startup procedure for external SQL stored procedures needs one unauthorized data set included in STEPLIB.

```

/*****
/** JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
/** ADDRESS SPACE
/** RGN      -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.
/** DB2SSN   -- THE DB2 SUBSYSTEM NAME.
/** NUMTCB   -- THE NUMBER OF TCBS USED TO PROCESS
/**          END USER REQUESTS.
/** APPLENV  -- THE MVS WLM APPLICATION ENVIRONMENT
/**          SUPPORTED BY THIS JCL PROCEDURE.
/**
/*****
//DB9AWLM PROC RGN=0K,APPLENV=WLMENV,DB2SSN=DB9A,NUMTCB=40,MNSPAS=3
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//            PARM='&DB2SSN,&NUMTCB,&APPLENV,&MNSPAS'
//STEPLIB DD DISP=SHR,DSN=DB9AU.RUNLIB.LOAD
//          DD DISP=SHR,DSN=CEE.SCEERUN
//          DD DISP=SHR,DSN=DB9A9.SDSNEXIT
//          DD DISP=SHR,DSN=DB9A9.SDSNLOAD

```

3. Define the application environment to WLM by using one of the following methods.
  - Use the WLM administrative application (IWMARIN0) to define a new environment or copy or modify an existing one.



- a. In the first WLM panel, Definition Menu, enter 9 for Application Environments.  
The application environment definition panel is displayed.
  - b. On the application environment definition panel, specify the appropriate action code:
    - Create a new WLM application environment.
    - Copy an existing WLM application environment.
    - Modify an existing WLM application environment.
 The appropriate panel for creating, copying or modifying the application environment is displayed.
  - c. If you are creating or modifying a WLM environment, specify the appropriate options for the WLM application environment definition, using the same application environment name and procedure name that you specified for the startup procedure.
  - d. After you specify the appropriate options, press Enter to create the application environment definition.
    - Modify and run sample job DSNTIJRW. As provided, DSNTIJRW creates the core DB2 WLM environments, but you can modify the job to define your own WLM environments. Job DSNTIJMV copies an address space procedure for each of the DB2 core WLM environments into SYS1.PROCLIB.
4. Install the WLM service definition that contains information about the application environment by opening the WLM Definition Menu panel and selecting the **Install** function in the **Utilities** menu bar.
  5. Activate the WLM service policy from the installed service definition by completing one of the following actions:
    - Issue the VARY WLM command as follows:  
VARY WLM,POLICY=*policy-name*
    - On the WLM Definition Menu panel, choose the **Activate service policy** option from **Utilities** menu bar.
  6. Set up security for the WLM application environments and for creating stored procedures by completing the following actions:
    - a. Optional: Specify which WLM-established address spaces can run stored procedures. If you do not complete this step, any WLM-established address space can run stored procedures.
    - b. Grant access to users to create procedures in specific WLM address spaces.
    - c. Grant access to users to create procedures in specific schemas. Use the GRANT statement with the CREATIN option for the appropriate schema.
    - d. Grant access to users to create packages for procedures in specific collections. Use the GRANT statement with the CREATE option for the appropriate collection.
 

**Requirement:** For native SQL procedures, the collection name for the package must be the same as the schema name.
    - e. Grant access to refresh the WLM environments to the appropriate people.

For more detail, see Managing authorization for stored procedures (Managing Security).
  7. Ensure that the ID that is used to run the JCL startup procedure for the WLM application environment has permission to use RRSF. Each time one of the DB2 WLM address spaces is started, it uses RRSF to attach to DB2.

## What to do next


When you create or alter a stored procedure, specify the WLM application environment that DB2 is to use in the WLM\_ENVIRONMENT option of the CREATE or ALTER PROCEDURE statement. When you specify environments, be aware that:

- Routines that have low memory requirements and that are frequently called should not share an environment with routines that have high memory requirements and are rarely called. Otherwise, storage is wasted.
- Stored procedures can be grouped according to the authorization settings for a WLM environment.
- WLM environments should not be shared among routines that use the same DD name for different purposes.
- WLM environments should not be shared among routines if one routine allocates data sets in the environment and that routine is run only occasionally. If other routines that do not use the data sets use the environment, the data sets are kept artificially allocated, which might interfere with other tasks.


### Related concepts:

WLM-established stored procedures address spaces storage requirements

### Related tasks:

 [Setting up and managing Workload Manager \(DB2 for z/OS Stored Procedures: Through the CALL and Beyond\)](#)


 [Managing authorization for stored procedures \(Managing Security\)](#)


 [Refreshing WLM application environments for stored procedures \(DB2 Administration Guide\)](#)

### Related reference:

Core WLM environments for DB2-supplied routines

DSNTWLMB tool

 [GRANT \(collection privileges\) \(DB2 SQL\)](#)

 [GRANT \(schema privileges\) \(DB2 SQL\)](#)

 [set\\_dub\\_default \(BPX1SDD, BPX4SDD\) \(z/OS UNIX System Services Programming\): Assembler Callable Services Reference](#)

### Related information:

 [Using Operator Commands for Application Environments \(z/OS MVS Planning: Workload Management\)](#)

## Migration step 26: Set up DB2-supplied routines



Installation jobs are provided for the setup of all DB2-supplied routines and supporting objects that are provided with the DB2 base product.

### Related tasks:

Disabling DB2-supplied routines for validation

 [From V8](#) Checklist for migration to DB2 Version 10 conversion mode from Version

8  [From V8](#)

 [From V9.1](#) Checklist for migration to DB2 Version 10 conversion mode from Version 9.1  [From V9.1](#)

### Related reference:

Installation information for procedures and functions that are supplied with DB2

➔ Procedures that are supplied with DB2 (DB2 SQL)

## Setting up the DB2 core WLM environments during migration

DB2 stored procedures (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

### About this task

For DB2-supplied routines, you can use the provided definitions for core WLM environments as a starting point for defining your environments. You can also manually define the WLM environments by using the IWMARIN0 application, as described in Setting up a WLM application environment for stored procedures during installation.

**Exception:** You do not need to complete this configuration task for native SQL procedures unless they call at least one external stored procedure or external SQL procedure. This task also applies to native SQL procedures that call at least one user-defined function or that are defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE. Otherwise, this task applies to only user-defined functions, external stored procedures, external SQL procedures, and DB2-supplied stored procedures

### Procedure

To set up the provided core WLM environments:

Run job DSNTIJRW.

Job DSNTIJRW invokes the DSNTWLMB tool to create the core WLM environments. The CLIST assigns the core WLM environment names in DSNTIJRW according to the values that are specified on panel DSNTIPR1. For detailed information about the environments that are created by DSNTIJRW, see “Core WLM environments for DB2-supplied routines” on page 884.

#### Related concepts:

WLM management of stored procedures

#### Related reference:

DSNTWLMB tool

DSNTIPR1: Parameters for DB2-supplied routines panel

## Installing DB2-supplied routines during migration

The DSNTIJRT and DSNTIJRV jobs install and validate the installation of routines that are supplied with DB2. These jobs are configured with the options that you specified on installation panel DSNTIPR1 and panels DSNTIPRA through DSNTIPRP.

### Before you begin

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that runs the DSNTIJRW job requires READ access. To grant READ access to a user, an administrator must submit the following command:

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
```

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that runs the DSNTIJRV job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVfy console that is used in this job. To add a discrete profile for the DSNTRVfy console, an administrator must complete the following steps:

1. Establish a discrete profile for MVS.MCSOPER.DSNTRVfy by issuing the following command:  

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNTRVfy UACC(NONE)
```
2. Grant READ access to the user that runs the DSNTIJRV job by issuing the following command:  

```
PERMIT MVS.MCSOPER.DSNTRVfy CLASS(OPERCMDS) ID(user) ACCESS(READ)
```
3. Refresh the OPERCMDS class by issuing the following command:  

```
SETROPTS RACLIST(OPERCMDS)REFRESH
```

Resource Recovery Services (RRS) is also required for these jobs.

**Important:** Job DSNTIJRT defines, binds, and grants access to stored procedures and user-defined functions. The default setting for GRANT EXECUTE is PUBLIC, meaning that anyone who can access DB2 can use these stored procedures. Use the GRANT EXECUTE fields on panels DSNTIPRB through DSNTIPRP to specify different access lists when you run the installation CLISTS.

Before running job DSNTIRT, review the configuration statements under the CFIGIN DD statement to verify the settings of the WLMENV, GRANTTO, and optional PKGOWNER parameters.

**Important:** DSNAEXP can execute the EXPLAIN statement on any explainable SQL statement that is valid on the system, and the EXPLAIN output can reveal potentially sensitive information. The privileges to run DSNAEXP should therefore be granted with consideration. For example, you should avoid granting access for DSNAEXP to PUBLIC.

## Procedure

To install the DB2-supplied routines:

1. Run job DSNTIJRT to install and configure all DB2-supplied routines.
2. After DSNTIJRT successfully completes, run job DSNTIJRV to validate the installation of the routines.
3. **From V9.1** If you used the SYSPROC.XSR\_COMPLETE stored procedure in DB2 9, then ensure that the WLM environment that is used for running XSR\_COMPLETE is updated to use the DB2 10 code paths. The following parameters in the Java Language Environment (JAVAENV) data set for the WLM environment are affected:
  - DB2\_BASE
  - JCC\_HOME
  - JAVA\_HOME
4. **From V9.1** If you did not perform any of the following steps when you originally installed the DB2 subsystem, complete additional setup steps for any of the following routines that you plan to use.
  - The stored procedures for XML schema support

- The administrative task scheduler routines and administrative enablement routines
- The CICS transaction invocation procedure
- The DSNAEXP EXPLAIN stored procedure
- The common SQL API stored procedures
- The WebSphere MQ user-defined functions
- The web service user-defined functions


## What to do next

After installing the DB2-supplied routines, you can choose to disable any of the routines that are unnecessary or unusable on your subsystem.

### Related concepts:

Configuration control statements for DB2-supplied routines

### Related tasks:

 Granting privileges for executing stored procedures and stored procedure packages (Managing Security)

Disabling DB2-supplied routines for validation

### Related reference:

Core WLM environments for DB2-supplied routines

## Job DSNTIJRT:

Job DSNTIJRT installs and configures DB2-supplied routines by executing program DSNTRIN.

DSNTIJRT provides a *configuration control statement* for each DB2-supplied routine and the mode for processing those statements. The configuration control statement specifies the WLM environment, list of authorization IDs that are allowed to execute the routine, and optional package owner for the routine. DSNTRIN reads and validates those statements and uses them to create and customize routines and supporting objects.

## Format

DSNTRIN accepts the following parameters:

### DB2SSN

Identifies the DB2 subsystem on which to install and configure the DB2-supplied routines.

### MODE

During SQL processing, DSNTRIN configures each routine with the WLM environment specified in the configuration control statement for that routine. Processing behavior depends on the DSNTRIN run mode, the DB2 catalog mode, and which objects already exist.

### INSTALL

This is the normal operating mode. Use it when installing or migrating to DB2.

Create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the routine already exists, it is updated, if necessary, to use the WLM environment specified in the configuration control statement for

that routine. If the package for a routine already exists, it is not bound again unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **REINSTALL**

This mode behaves like INSTALL mode, except that existing DB2-supplied routines and created global temporary tables are dropped ahead of other processing. Existing related databases, table spaces, tables, and indexes are not dropped, except as discussed in the special notices section of the DSNTIJRT job prolog.

Use REINSTALL mode only if you have a specific need to drop and re-create all DB2-supplied routines. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines and any related created global temporary tables are first dropped before they are re-created. Related databases are not dropped if they already exist, but they are created if they do not exist. If a supporting object is used by more than one routine, the object is created when one of those routines is first created. Drop processing of routines and related objects that do not exist is bypassed.

### **REINITIALIZE**

This mode behaves like REINSTALL mode, except that existing databases, table spaces, tables, and indexes used by the DB2-supplied routines are also dropped ahead of other processing.

REINITIALIZE mode drops and reinitializes databases such as the XSR database that may contain information needed by DB2 for other processing. Therefore, use REINITIALIZE mode only when advised to do so by IBM Software Support. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the DB2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines, existing related created global temporary tables, and existing related databases are first dropped before they are re-created. After each SQL statement, a COMMIT statement is issued. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

|  
| **INSTALL-PREVIEW**

| Simulate INSTALL mode without updating the system. Generated JCL with  
| embedded DDL and bind statements is outputted to the JCLOUT DD  
| statement.

| **REINSTALL-PREVIEW**

| Simulate REINSTALL mode without updating the system. Generated JCL  
| with embedded DDL and bind statements is outputted to the JCLOUT DD  
| statement.

| **REINITIALIZE-PREVIEW**

| Simulate REINITIALIZE mode without updating the system. Generated  
| JCL with embedded DDL and bind statements is outputted to the JCLOUT  
| DD statement.

| **AUTHID**

| DSNTRIN uses this value as the CURRENT SQLID for creating and  
| configuring most DB2-supplied routines. DSNTRIN also uses this value as the  
| default OWNER for binding packages for the DB2-supplied routines that do  
| not have the PKGOWNER specified in the configuration control statement.

| **SECDEFID**

| DSNTRIN uses this value as the CURRENT SQLID setting when creating and  
| configuring DB2-supplied routines that are defined with the SECURITY  
| DEFINER option.

| The ID that you specify for SECDEFID must be an ID that can be used as a  
| logon ID, because WLM uses the ID to execute DB2-supplied routines that are  
| defined with SECURITY DEFINER.

| **Input**

| DSNTRIN allocates the following DD statements for input:

| **DBRMLIB**

| Location of the DBRMs for DB2-supplied routines. This is typically the  
| *prefix.SDSNDBRM* target library.

| **SYSUT1**

| Internal work file for the DB2 installation bind interface (DSNTRBI).

| **CFIGIN**

| Location of the configuration control statements for DB2-supplied routines.

| **DB2OPT**

| This required DD can contain the following optional parameters:

| **STOGROUP**

| Specifies a storage group to use for creating databases and table spaces  
| that are used by the routines that are supplied with DB2. If this  
| parameter is not specified, the default SYSDEFLT storage group is  
| used.

| **INDEXSTOG**

| Specifies a storage group to use for creating indexes instead of the  
| default SYSDEFLT storage group.

| **BP4K** Specifies an alternate 4-KB buffer pool for base table spaces that are  
| created by DSNTRIN. The default 4-KB buffer pool is BP0.

| **BP8K** Specifies an alternate 8-KB buffer pool for base table spaces that are  
| created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

**BP16K**

Specifies an alternate 16-KB buffer pool for base table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

**BP32K**

Specifies an alternate 32-KB buffer pool for base table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K.

**LOBBP8K**

Specifies an alternate 8-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

**LOBBP16K**

Specifies an alternate 16-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

**Note:** DSNTRIN does not create or activate this storage group or any of these buffer pools.

**Output**

DSNTRIN allocates the following DD statements for output:

**SYSPRINT**

Destination for echo of configuration control statements that are read and for messages that are generated during processing. Each processed routine generates at least one status message.

**SYSTSPRT**

Internal message file for the DB2 installation bind interface (DSNTRBI).

**CFIGOUT**

Destination for configuration control statements that are read by DSNTRIN. This output is useful for diagnostic purposes when DSNTRIN reports an error in a configuration control statement.

**SQLOUT**

Destination for DDL statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

**BINDOUT**

Destination for bind statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

**JCLOUT**

Destination for a generated sample job that is generated when one of the PREVIEW modes is specified. The job contains steps that process inline DDL and bind statements that are needed to install and configure missing, downlevel, or incorrectly configured DB2-supplied routines. This DD is required if you specify a PREVIEW mode.

Example of executing DSNTRIN in INSTALL mode:

```
//DSNTRIN EXEC PGM=DSNTRIN
//          PARM=('DB2SSN(VA1A) MODE(INSTALL) AUTHID(AUTHID) SECDEFI-
//          D(ADMFO01)')
//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//          DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
```



```

//BINDOUT DD SYSOUT=*
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)
...
//*

```

Example of executing DSNTRIN in INSTALL-PREVIEW mode:

```

//DSNTRIN EXEC PGM=DSNTRIN
// PARM='DB2SSN(VA1A) MODE(INSTALL-PREVIEW) AUTHID(AUTHID)'
//DBRMLIB DD DISP=SHR,DSN=DSN!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
// DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//JCLOUT DD DSN=USER.JCLLIB(DB2INST),DISP=SHR
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)
...
//*

```

**Related concepts:**

Configuration control statements for DB2-supplied routines  
Installation and migration jobs that the CLIST tailors

**Related reference:**

Core WLM environments for DB2-supplied routines

## Job DSNTIJRV:

Job DSNTIJRV validates the DB2-supplied routines by executing program DSNTRVFY. You should validate these routines after DB2 installation and after each phase of migration.

DSNTRVFY validates a single routine, multiple routines, or all DB2-supplied routines. DSNTRVFY produces a report that identifies routines that passed the validation and possible problem areas for routines that failed.

**Note:** DSNTRVFY creates, calls, and drops two temporary stored procedures. These temporary stored procedures are SYSPROC.DSNWLM\_INSTALL\_INFOJ and SYSPROC.DSNWLM\_INSTALL\_INFO. Both of these stored procedures exist only when DSNTRVFY is executing. DSNTRVFY calls SYSPROC.DSNWLM\_INSTALL\_INFOJ to validate the WLM environment that is assigned to each DB2-supplied Java routine. DSNTRVFY calls SYSPROC.DSNWLM\_INSTALL\_INFO to validate the WLM environment that is assigned to each DB2-supplied non-Java routine that runs in a WLM environment.

### Authorizations

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that submits this job requires READ access.

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that submits this job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVFY console that is used in this job.

### Format

DSNTRVFY accepts the following required parameters:

#### **DB2SSN(ssid)**

Identifies which DB2 subsystem to connect to for validating the DB2-supplied routines.

#### **ROUTINE(name)**

Identifies which DB2-supplied routine needs to be validated. The following values are supported for *name*:

- A routine name in the form of *schema-name.routine-specific-name*.
- The keyword **DD:SYSIN** to specify a list of routines. List the routines in the form of *schema-name.routine-specific-name* under the SYSIN DD statement with one routine per line.
- The keyword **ALL** to specify all DB2-supplied routines.

DSNTRVFY also accepts the following optional parameters:

#### **AUTHID(authorization ID)**

DSNTRVFY uses this value as the OWNER for BIND PACKAGE and BIND PLAN statements and as the CURRENT SQLID for issued SQL statements. If this value is not specified, the primary authorization ID is used for BIND PACKAGE, BIND PLAN, and issued SQL statements.

### Output

DSNTRVFY allocates the following required DD statements for output:

## **SYSPRINT**

Contains messages generated during verification processing. Each processed routine can generate one or more messages.

## **SYSTSPRT**

DSNTRVFY writes bind output to SYSTSPRT if an error occurs during bind processing.

The following JCL example is for validating a single routine:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,  
//          PARM='DB2SSN(VA1A) ROUTINE(SYSPROC.DSNUTILS) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *
```

The following JCL example is for validating multiple routines:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,  
//          PARM='DB2SSN(VA1A) ROUTINE(DD:SYSIN) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
          SYSPROC.DSNWZP  
          SYSPROC.DSNACCOR  
          SYSPROC.DSNUTILS  
          SYSPROC.DSNUTILU
```

The following JCL example is for validating all routines:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,  
//          PARM='DB2SSN(VA1A) ROUTINE(ALL) AUTHID(FVTGRP2) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *
```

## **Processing**

DSNTRVFY completes the following validation:

- Verifies that the routine is defined to the SYSIBM.SYSROUTINES catalog.
- Verifies that the collection ID defined in the SYSIBM.SYSROUTINES catalog table matches the collection ID used to bind the package.
- Verifies that the routine is currently defined with the DB2-reserved WLM application environment name DSNWLM\_NOT\_ENABLED, indicating that it is not enabled to run on the current DB2 subsystem. If it is, then a warning message is issued and the validation is bypassed.
- Verifies if the routine can be executed on the current DB2 catalog mode.
- Verifies the APF authorization requirements.
- Verifies if the WLM application environment is defined and available for use.
- Verifies if the NUMTCB setting is valid or within the recommended range.
- Verifies if the required DD statements for some of the routines are defined.
- Verifies if the WLM environment assigned to Java routines is enabled for Java.

- Verifies security coexistence requirements (for example, some routines should run on only their own WLM application environment).
- Verifies that the selected routine can be called successfully. Certain routines such as DSNACICS, DSNAIMS, MQSeries functions, and most debugger routines are restricted to basic validation and are not called.

During the running of this job, the following message might be issued on the system console:

```
IEFC452I DB2UDSMD - JOB NOT RUN - JCL ERROR
```

In most cases, this message is normal and can be disregarded. If you use IBM Optim Development Studio, see Debugging stored procedures on DB2 for z/OS with Optim Development Studio, Part 2 (IBM developerWorks) for information about DB2UDSMD.

If the validation is successful, the following message is issued:

```
DSNT027I DSNTRVfy VALIDATION FOR schema.routine-specific-name SUCCESSFUL
```

If the validation fails, messages are issued to explain the reasons for failure. Examine these messages and make necessary adjustments before running the validation job again.

### Input

DSNTRVfy requires the following DD statements for input:

#### DBRMLIB

Identifies the library where the DBRM for the DSNTRVfy program is located. This is typically the *prefix.SDSNDBRM* target library.

#### SYSIN

Contains the list of DB2 routines. This is required when the validation type is for multiple routines (DD:SYSIN).

#### SYSUT1

Work data set required for bind processing.

### Limitations

The following limitations apply to the DSNTRVfy program:

- The name of the routine in the form *schema-name.routine-specific-name* is limited to 72 characters, the maximum line length in JCL.
- Only DB2 10 DB2-supplied routines are supported for validation.
- Some routines, if enabled, receive basic validation to ensure that they are defined correctly and assigned to a valid WLM application environment. However, validation will not extend to calling these routines for one or more of the following reasons:
  - Optional system support such as CICS, IMS, or MQSeries is required.
  - External setup on a remote server or workstation is required.
  - A call could introduce or modify data unexpectedly in a production environment.

The DB2-supplied routines that are restricted to basic validation are:

- DB2DEBUG.CREATE\_SESSION
- DB2DEBUG.DESTROY\_SESSION

- |                   – DB2DEBUG.GET\_REPORT
- |                   – DB2DEBUG.LIST\_SESSION
- |                   – DB2DEBUG.PUT\_COMMAND
- |                   – SYSFUN.SYSTS\_ENCRYPT
- |                   – SYSFUN.XSLTRANSFORM
- |                   – SYSPROC.ADMIN\_COMMAND\_UNIX
- |                   – SYSPROC.ADMIN\_JOB\_CANCEL
- |                   – SYSPROC.ADMIN\_JOB\_FETCH
- |                   – SYSPROC.ADMIN\_JOB\_QUERY
- |                   – SYSPROC.ADMIN\_JOB\_SUBMIT
- |                   – SYSPROC.DBG\_ENDSESSIONMANAGER
- |                   – SYSPROC.DBG\_INITIALIZECLIENT
- |                   – SYSPROC.DBG\_RECVCLIENTREPORTS
- |                   – SYSPROC.DBG\_SENDCLIENTREQUESTS
- |                   – SYSPROC.DBG\_SENDCLIENTCOMMANDS
- |                   – SYSPROC.DBG\_TERMINATECLIENT
- |                   – SYSPROC.DSNACICS
- |                   – SYSPROC.DSNAIMS
- |                   – SYSPROC.DSNAIMS2
- |                   – SYSPROC.DSNLEUSR
- |                   – SYSPROC.SYSTS\_ALTER
- |                   – SYSPROC.SYSTS\_CREATE
- |                   – SYSPROC.SYSTS\_DROP
- |                   – SYSPROC.SYSTS\_RESTORE
- |                   – SYSPROC.SYSTS\_START
- |                   – SYSPROC.SYSTS\_STOP
- |                   – SYSPROC.SYSTS\_TAKEOVER
- |                   – SYSPROC.SYSTS\_UPDATE
- |                   – All MQSeries, web services, and SOAP functions (those with schema DB2MQ, DB2MQ1C, DB2MQ2C, or DB2XML)

## Migration step 27: Verify views

During migration to DB2 10 conversion mode (from Version 8 or Version 9), some views might be marked with view regeneration errors. If any views are marked with view regeneration errors, you can regenerate those views again.

### Procedure



To verify views:

- 1.
2. Issue the following query to determine which views were marked with view regeneration errors during migration:

```

SELECT CREATOR,NAME
FROM SYSIBM.SYSTABLES
WHERE TYPE = 'V'
AND STATUS = 'R'
AND TABLESTATUS = 'V'

```

3. If any views have view regeneration errors, issue the following ALTER VIEW statement:

```
ALTER VIEW view REGENERATE
```

where *view* is the name of the view with regeneration errors.

You can use the DSNTIAUL program to generate the ALTER VIEW statement as follows:

```

// EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
  DSN SYSTEM(dsn)
  RUN PROGRAM(DSNTIAUL) PLAN(DSNTIB10) +
  LIB('prefix.RUNLIB.LOAD') PARMS('SQL')
END
/*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  SELECT SUBSTR(
    'ALTER VIEW '
    || STRIP(CREATOR) || '.' || NAME
    || ' REGENERATE ;'
    ||
    ||
    ||
    ,1,80)
  FROM SYSIBM.SYSTABLES
  WHERE TYPE = 'V'
  AND STATUS = 'R'
  AND TABLESTATUS = 'V'
;
/*
//SYSPUNCH DD DUMMY
//SYSREC00 DD DISP=(NEW,CATLG,DELETE),
//          DSN=&SYSUID.SQLTIAUL.ALTVIEWS,
//          UNIT=SYSDA,SPACE=(TRK,(750,75),RLSE)

```

### GUPI

#### Related tasks:

##### From V8

Checklist for migration to DB2 Version 10 conversion mode from Version 8

##### From V8

##### From V9.1

Checklist for migration to DB2 Version 10 conversion mode from Version 9.1

##### From V9.1

#### Related reference:

[ALTER VIEW \(DB2 SQL\)](#)

[DSNTIAUL \(DB2 Application programming and SQL\)](#)

## Migration step 28: Take an image copy of the DB2 10 conversion mode (from Version 8 or Version 9) catalog: DSNTIJIC

For backup purposes, create a copy of the DB2 10 conversion mode (from Version 8 or Version 9) catalog and directory.

### Procedure

To create an image copy of the directory and catalog:

Run the DB2 10 DSNTIJIC job.


COPY returns message DSNU1530I for each table space that has not yet been defined. These table spaces are defined as part of enabling-new-function mode (from Version 8 or Version 9).

### Related tasks:

 From V8

Checklist for migration to DB2 Version 10 conversion mode from Version 8


 From V8

 From V9.1

Checklist for migration to DB2 Version 10 conversion mode from Version 9

 From V9.1

### Related information:

 [DSNU1530I \(DB2 Messages\)](#)

## Migration step 29: Set up the administrative task scheduler

| You can use the administrative task scheduler to execute administrative tasks  
| according to a time-based or event-based schedule. These setup tasks are required  
| only if you want to start using the administrative task scheduler in DB2 10. If you  
| use the administrative task scheduler in your existing release, skip to the next  
| migration step.

### Before you begin

You should have run job DSNTIJRA and job DSNTIJIN before you set up the administrative task scheduler.

### About this task

| **Restriction:** After migration to conversion mode (from Version 8 or Version 9), the  
| administrative task scheduler is disabled until you run job DSNTIJRT.

The following figure shows an overview of the steps for installing and configuring the administrative task scheduler.

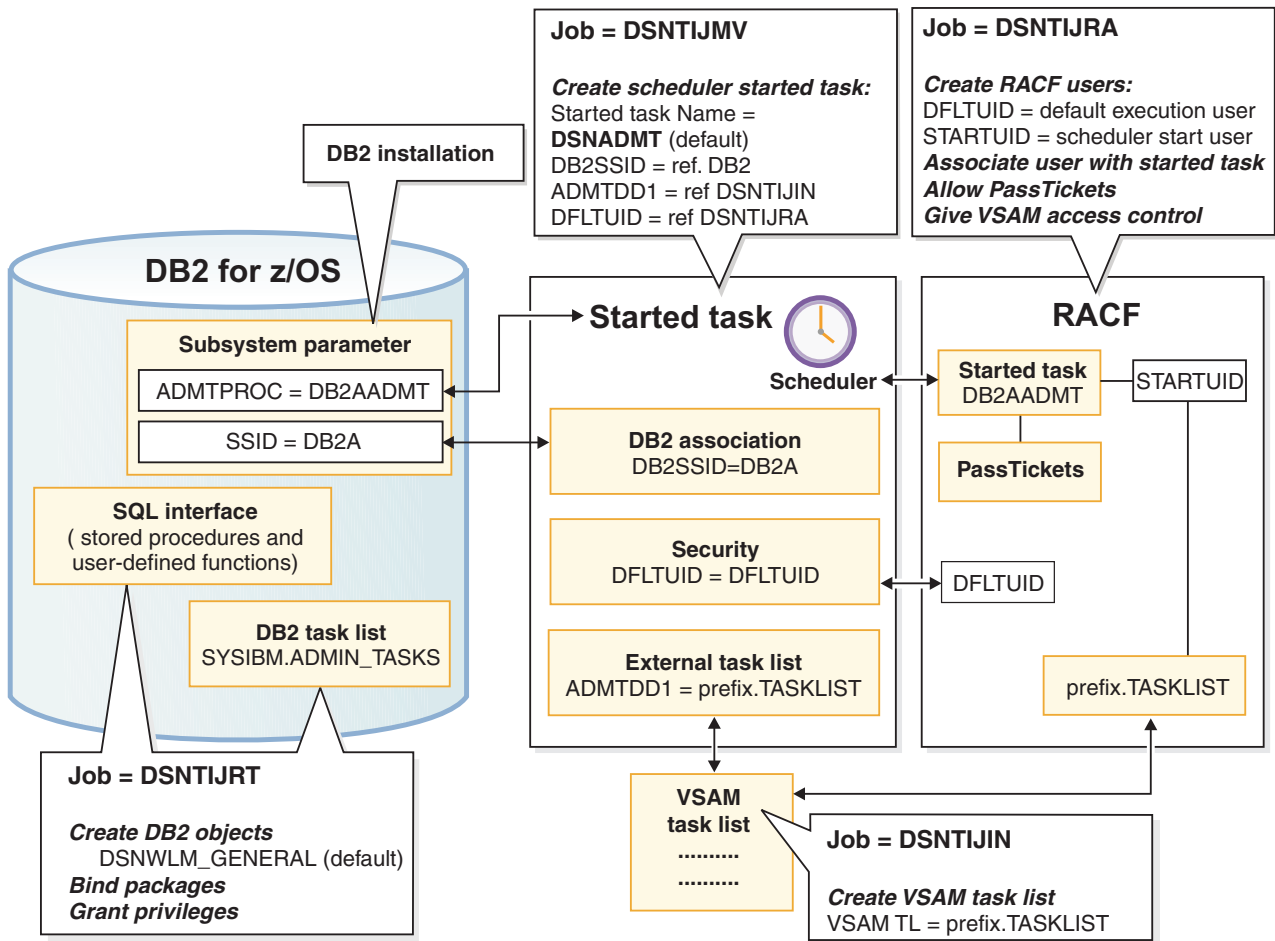


Figure 77. Setting up the administrative task scheduler

## Procedure

To set up the administrative task scheduler:

1. Customize the administrative task scheduler address space startup procedure (xxxxADMT) in job DSNTIJMV. The name of the startup procedure needs to match the value of the ADMTPROC subsystem parameter. Before using the startup procedure, locate and review the settings for the following parameters:

### DB2SSID

The name of this DB2 subsystem.

### DFLTUID

The default ID that is used by the administrative task scheduler to execute its tasks. DFLTUID must be different than the ID that is used to start this address space.

### TRACE

Indicates whether to activate tracing for the administrative task scheduler. The value can be ON or the default value of OFF.

You can specify other parameters, such as ERRFREQ, MAXHIST, MAXTHD, or STOPONDB2STOP in the startup procedure similarly to the three parameters DB2SSID, DFLTUID and TRACE.

### ERRFREQ

Specifies how frequently message DSN679I displays on the console,



indicating that one of the redundant, active copies of the task list is not accessible. By default, this message displays on the console once per minute, for example, when DB2 is offline.

### MAXHIST

Specifies the number of status entries per task that are stored. This parameter is a positive integer with a default value of 10. When the limit is reached, the oldest status entries are deleted.

### MAXTHD

Specifies the maximum number of execution threads for an administrative task scheduler. The default value is 99.

### STOPONDB2STOP

Specifies that the administrative task scheduler will terminate when DB2 is stopped.

Also locate and review the ADMTDD1 DD statement. The VSAM data set that is indicated must match the VSAM task list data set that is defined in job DSNTIJIN.

The following example shows how these parameters can be updated.

```
//DSNADMT PROC LIB='DSN!!0.SDSNLOAD',
//          DB2SSID=DSN,
//          DFLTUID=DFLTUID,
//          TRACE=OFF,
//          MAXTHD=10
//*
//STARTADM EXEC PGM=DSNADMT0,DYNAMNBR=100,REGION=0K,
//          PARM=('DB2SSID=&DB2SSID',
//              ' DFLTUID=&DFLTUID',
//              ' TRACE=&TRACE'
//              ' MAXTHD=&MAXTHD'
//              ' ERRFREQ=1440'
//              ' STOPONDB2STOP')
//STEPLIB DD DISP=SHR,DSN=&LIB
//ADMTDD1 DD DISP=SHR,DSN=DSNC!!0.TASKLIST
```

2. Ensure that the administrative task scheduler routines were enabled. They were enabled by job DSNTIJRT.
3. Create a job to make image copies of the administrative task scheduler table spaces. Establish a schedule for making image copies. In general, you should back up important databases on a regular basis. The database for the administrative task scheduler is no exception and should be copied on the same frequency as the DB2 catalog and directory. The following example shows how to copy the table spaces in this database to stacked data sets on tape with a retention period of 99 days:

```
//*
//DSNTIC EXEC PGM=DSNUTILB,PARM='DSN,IMAGCOPY',COND=(4,LT)
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//DSNTRACE DD SYSOUT=*
//SYSLISTD DD *
LISTDEF DSNLDEF
INCLUDE TABLESPACES DATABASE DSNADMDB
//SYSIN DD *


TEMPLATE DSNTPLT
DSN(prefix.IMAGCOPY.&DB.;&TS.;)
DISP (NEW,KEEP,DELETE)
UNIT TAPE
STACK YES
```

```
RETPD 99
COPY LIST DSNLDEF
COPYDDN(DSNTPLT)
```

/\*


#### Related concepts:

Administrative task scheduler address space storage requirements

 Multi-threading in the administrative task scheduler (DB2 Administration Guide)

#### Related tasks:

Additional steps for enabling the administrative task scheduler and administrative enablement routines

 Scheduling administrative tasks (DB2 Administration Guide)

#### From V8

Checklist for migration to DB2 Version 10 conversion mode from Version 8


#### From V8

#### From V9.1

Checklist for migration to DB2 Version 10 conversion mode from Version 9.1

#### From V9.1

#### Related information:

 DSNNA677I (DB2 Messages)

## Migration step 30: Verify your DB2 10 conversion mode (from Version 8 or Version 9) system (optional)

Verify your DB2 10 conversion mode (from Version 8 or Version 9) system by running some of the sample jobs from your previous release.

### About this task

If all of the local DB2 objects from your Version 8 or DB2 9 subsystem still exist (that is, if you have not run job DSNTEJ0), follow this procedure.

### Procedure

To verify your DB2 10 conversion mode (from Version 8 or Version 9) system:

1. Change the JOBLIB statements to point to *prefix.SDSNLOAD*.
2. Ensure that the DSN8EAE1 module that you created when you originally ran the Version 8 or DB2 9 sample jobs is copied to *prefix.SDSNEXIT*. DSN8EAE1 is an EDITPROC that is used by the employee sample table.
3. Edit the Version 8 or DB2 9 sample jobs before running them. Do not run all the sample jobs. Run only the specific jobs and job steps that are listed in the following steps.
4. Test the migration of the IVP phase 2 applications from your previous version:
  - a.

#### From V9.1

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH91) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD91) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE91) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF91) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

From V9.1

a.

From V8

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH81) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD81) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE81) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF81) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

From V8

- 5. Test the migration of the IVP phase 3 applications from your previous version:
  - a. Do not run job DSNTEJ3C or DSNTEJ3P.
  - b. If you want to test the Version 8 or DB2 9 ISPF-CAF applications under DB2 10, place the Version 8 or DB2 9 SDSNSPFP panel library ahead of the DB2 10 SDSNSPFP panel library in the ISPLIB concatenation. This placement is necessary so that the plans that are migrated from your previous version can be used. Remove the Version 8 or DB2 9 SDSNSPFP library from your ISPLIB concatenation when you are finished testing the Version 8 or DB2 9 IVP applications under DB2 10.

## What to do next

Do not run any other Version 8 or DB2 9 sample jobs.

### Related concepts:

Dynamic SQL and the ISPF/CAF application

### Related tasks:

Ensure that sample objects from your previous release are available

**From V8** Checklist for migration to DB2 Version 10 conversion mode from Version 8 **From V8**

**From V9.1** Checklist for migration to DB2 Version 10 conversion mode from Version 9.1 **From V9.1**

## Migration step 31: Collect improved statistics (optional)

When migration to DB2 10 conversion mode (from Version 8 or Version 9) is complete, you should run RUNSTATS before rebinding your application packages to collect improved statistics.

### About this task

Running RUNSTATS before rebinding packages or executing dynamic SQL statements isolates the opportunity for DB2 10 access path changes to the first rebind only.

Rebinding packages before running RUNSTATS introduces the DB2 10 optimizer to statistics from the previous version. Therefore, if you do not run RUNSTATS before rebinding packages, the DB2 10 optimizer is not introduced with DB2 10 statistics until the next rebind after running RUNSTATS.

### Procedure

To collect improved DB2 statistics:

Before rebinding your application packages, use the following guidelines:

- 

**From V8**

If you migrated from DB2 Version 8, run your standard RUNSTATS procedures against all table spaces.

This action is recommended before rebinding application packages because DB2 9 introduced improved formulas for index statistics, including CLUSTERRATIOF.

**From V8**

- If your standard DB2 Version 8 or DB2 9 RUNSTATS procedures do not include the KEYCARD option of RUNSTATS, you should run your standard RUNSTATS procedures against all table spaces.

This action is recommended because by default, DB2 10 automatically collects the statistics that are collected when the KEYCARD option is specified.

#### Related tasks:

**From V8**

Checklist for migration to DB2 10 conversion mode from DB2 Version 8

**From V8**

**From V9.1**

Checklist for migration to DB2 10 conversion mode from DB2 9

From V9.1

## Falling back to DB2 9

*Falling back* is the process of returning to Version 8 or DB2 9 after migrating your catalog and directory to DB2 10 conversion mode (from Version 8 or Version 9).

### Before you begin

To fall back, your subsystem must be in DB2 10 conversion mode (from Version 8 or Version 9).

Before you fall back to your previous DB2 version, consider the implications of doing so. For details, see “Implications of falling back” on page 683.

### About this task

#### Important restrictions:

- 

From V8

If you migrated from a Version 8 subsystem, you can only fall back to Version 8. A subsystem that has started migration to DB2 10 and then fallen back to Version 8 cannot subsequently migrate to DB2 9.

From V8

- 

From V9.1

If you migrated from a DB2 9 subsystem, you can only fall back to DB2 9.

From V9.1

You can fall back to a previous version only after successfully migrating the catalog to DB2 10 conversion mode (from Version 8 or Version 9). However, you cannot fall back to a previous version or return to DB2 10 conversion mode (from Version 8 or Version 9) after the subsystem enters DB2 10 enabling-new-function mode (from Version 8 or Version 9) or new-function mode.

Fall back if you have a severe error while operating DB2 10 and you want to return to operation on your previous version. After fallback, the catalog remains a DB2 10 catalog.

*Remigrating* is the process of returning to DB2 10 conversion mode (from Version 8 or Version 9) after falling back.

### Procedure

To fall back to DB2 9, complete the following steps:

1. Stop DB2 10.
2. Run job DSNTIJFV to rename the cataloged procedures and reactivate DB2 9 code.

3. Reconnect TSO, IMS, and CICS to DB2 9.
4. Start DB2 9.
5. Run the DB2 9 installation verification jobs (DSNTEJxx).

## What to do next

You can save your DB2 10 TSO logon procedures and JCL for remigration to DB2 10.

### Related concepts:

Migration modes for DB2 Version 8 to DB2 10

Migration modes for DB2 9 to DB2 10

### Related tasks:

Installation step 15: Tailor the DB2 catalog: DSNTIJTC

Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode

Remigrating

## Fallback step 1: Stop DB2 10 activity

Before you can fall back, you must stop DB2 10 activity and ensure that no recovery is required on system databases.

### Procedure

To stop DB2 10 work:

1. Issue the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

The QUIESCE keyword allows DB2 to complete processing of currently executing programs. This activity might require some processing time.

2. Issue the following command:

**GUIP**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP**

This command allows only the installation-defined system administrators and system operators to access DB2.

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Check to see that you started DB2 with the correct subsystem parameter load module.

3. Ensure that all work is complete.
  - Ensure that no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use RECOVER INDOUBT for any indoubt threads.

- Ensure that no utility work remains. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY UTILITY(*)
```

**GUIP**

Then, either allow utilities to complete before proceeding, or stop all utility processing with the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the DB2 directory (DSNDB01) or the DB2 catalog (DSNDB06) have write error ranges or deferred restart states. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

**GUIP**

A user with installation-defined system administrator or system operator authority also must enter this command.

Recover any table spaces and index spaces with write error range or deferred restart states.

4. To stop DB2, issue the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

A user with SYSADM or SYSOPR authority also must enter this command.

If IRLM does not stop automatically when DB2 stops, stop IRLM manually. To stop IRLM, issue the following command, where *irlmproc* is the name you assigned to the IRLM startup procedure:

```
STOP irlmproc
```

## Fallback step 2: Reactivate Version 8 or DB2 9 code: DSNTIJFV

After you stop your DB2 10 activity, continue the fallback process by using job DSNTIJFV to reactivate the code of your previous DB2 version.

## About this task

Job DSNTIJFV renames procedures to activate Version 8 or DB2 9 and deactivate DB2 10.

### Procedure

To reactivate the code of your previous DB2 version:

1. (Optional) Tailor job DSNTIJFV.  
SYS1.PROCLIB is the default target for JCL procedures. Add statements to rename other procedures, such as your IMS, CICS, TSO logon procedures, and batch procedures. You might also need to rename procedures in your jobs from Version 8 or DB2 9.  
You might want two sets of procedures, such as DSN1xxxx and DSN2xxxx, at all times, with an alias for the current release level.
2. Run job DSNTIJFV.
3. Ensure that job DSNTIJFV completed successfully.
  - If DSNTIJFV runs successfully, it produces a return code of 0. Check that all renames executed successfully.
  - If DSNTIJFV fails or abends, rerun only the renames that failed. If some of the procedures already exist, check carefully to ensure that procedures for the two releases are not mixed.

## Fallback step 3: Reconnect TSO, IMS, and CICS to DB2 Version 8 or DB2 9

After you reactivate your Version 8 or DB2 9 code during fallback, reconnect TSO, IMS, and CICS to DB2.

### Procedure

To reconnect TSO, IMS, and CICS to DB2:

1. Re-establish your DB2 Version 8 or DB2 9 TSO logon procedures and JCL.
2. For CICS connections, complete one of the following actions:
  - If you overwrote the load module during migration to DB2 10, reassemble the resource control table (RCT) with the DB2 Version 8 or DB2 9 libraries.
  - If you did not overwrite the load module, change the STEPLIB statements in DB2 CICS jobs so that they refer to the DB2 Version 8 or DB2 9 libraries.
3. For IMS connections, change the STEPLIB statements in DB2 IMS jobs and address spaces so that they refer to the DB2 Version 8 or DB2 9 libraries.

## Fallback step 4: Start Version 8 or DB2 9

| During fallback, you can start Version 8 or DB2 9 after you re-establish your  
| Version 8 or DB2 9 TSO logon procedures, CICS connections, and IMS connections.  
| You can start Version 8 only if you migrated to DB2 10 from Version 8. You can  
| start DB2 9 only if you migrated from DB2 9.

### Procedure

To start Version 8 or DB2 9:



1. Start the IRLM. If you have not requested that DB2 automatically start the IRLM, start it before you start DB2. Use the following command, where *irlmproc* is the name that you assigned to the IRLM startup procedure:

```
START irlmproc
```

This is the value that you specified for the PROC NAME option on installation panel DSNTIPI.

If you specified YES for the AUTO START option on installation panel DSNTIPI, DB2 starts the IRLM automatically.

- 2.

#### GUIP

Start DB2 from the z/OS console by using the following command:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

In this command, *-DSN1* is the subsystem command prefix that you defined for DB2, and *DSNZPxxx* is the name of the Version 8 or DB2 9 subsystem parameter module. If you used the default name, *DSNZPARM*, you can omit the *PARM* parameter.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, and possibly *ssnmDIST* and *irlmproc*, where *ssnm* is the DB2 subsystem name and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of restart messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED  
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```


#### GUIP

3. Complete one of the following actions:

Option	Description
<p>If you have done distributed processing with your DB2 10 subsystem</p>	<p><b>GUPI</b></p> <p>Check message DSNR005I for the number of indoubt threads after you start DB2. If you find no indoubt threads, continue falling back as if you had not done any distributed processing. If you find indoubt threads, issue the following command:</p> <pre>-DSN1 DISPLAY THREAD(*) TYPE(INDOUBT)</pre> <p>If the number of indoubt threads that are reported in the DSNV408I messages is equal to the number of threads that are reported in the DSNR005I message, continue falling back as if you had not done any distributed processing. If fewer indoubt threads are reported by DSNV408I messages than in message DSNR005I, proceed as follows:</p> <ol style="list-style-type: none"> <li>1. Stop your Version 8 or DB2 9 subsystem.</li> <li>2. Determine which units of work are incomplete by scanning the DB2 recovery log with the DB2 10 DSN1LOGP utility. Use the SUMMARY option of this utility.</li> <li>3. Examine the DSN1LOGP output to find all the DSN1162I messages that have a COORDINATOR name in a remote location. Each of these messages identify an indoubt DBAT. Record the LUWID that is displayed in each message.</li> <li>4. Decide whether to commit or abort each indoubt DBAT. One way to do this is by contacting the COORDINATOR location. If it is another DB2 subsystem, use the DISPLAY THREAD command to help you decide.</li> <li>5. If you have not already done so during migration, apply the fallback PTF that is supplied with DB2 10.</li> <li>6. Start your Version 8 or DB2 9 subsystem again.</li> <li>7. Issue the RECOVER INDOUBT ACTION(<i>correct decision</i>) LUWID(<i>luwid</i>) command to resolve each indoubt DBAT.</li> </ol> <p><b>GUPI</b></p>
<p>If you have not done distributed processing with your DB2 10 subsystem</p>	<p>Check outstanding restrictions after you start DB2. Identify databases whose uses are restricted by issuing the following command:</p> <p><b>GUPI</b></p> <pre>-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT</pre> <p><b>GUPI</b></p> <p>You can start some of these databases at this time.</p>

4. If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the startup procedure is pointing to the correct BSDS and subsystem parameter. Also, check that the subsystem parameter member that you specified (or is used by default) when you started DB2 is the one that job DSNTIJUZ built. Check the JCL for the DB2 startup procedure.
5. Optional: Start TSO. If you want to use the TSO SUBMIT command to do housekeeping and fallback verification, you must start TSO (if it is not already started).

**Related tasks:**

 Starting a table space or index space that has restrictions (DB2 Administration Guide)

## Fallback step 5: Modify your DSNTIJIC job

When you migrate to DB2 10 conversion mode (from Version 8 or Version 9), new table spaces are added to the DB2 catalog. Therefore, when you fall back from DB2 10, you need to modify your Version 8 or DB2 9 image copy job (DSNTIJIC) to account for these new table spaces.

### Procedure

To modify your DSNTIJIC job:

Complete one of the following tasks:

- 

#### From V8

If you migrated from Version 8, add the following table spaces to the Version 8 DSNTIJIC job:

- DSNDB06.SYSCONTX
- DSNDB06.SYSPLUXA
- DSNDB06.SYSROLES
- DSNDB06.SYSRTSTS
- DSNDB06.SYSTARG
- DSNDB06.SYSTSASC
- DSNDB06.SYSTSUNI
- DSNDB06.SYSXML

Your Version 8 DSNTIJIC job is ready for use in fallback mode.

#### From V8

- 

#### From V9.1

If you migrated from DB2 9, add the following table spaces to the DB2 9 DSNTIJIC job:

- DSNDB06.SYSTSASC
- DSNDB06.SYSTSUNI

Your DB2 9 DSNTIJIC job is ready for use in fallback mode.

#### From V9.1

## Fallback step 6: Verify fallback

After you start Version 8 or DB2 9, you must complete some of your own testing to determine if the fallback was successful.

### About this task

You cannot run the DB2 10 samples on Version 8 or DB2 9.

## Procedure

To verify fallback:

1. Test the IVP phase 2 applications:

- a.

**From V9.1**

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH91) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD91) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE91) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF91) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

**From V9.1**

- a.

**From V8**

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH81) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD81) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE81) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF81) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

**From V8**

2. Test the IVP phase 3 applications. Do not run job DSNTEJ3C or DSNTEJ3P.
3. Run the sample applications of the DB2 version that you fell back to.
4. Test your own applications.
5. Retry the problem for which you decided to fall back.

### Related tasks:

Migration step 30: Verify your DB2 10 conversion mode (from Version 8 or Version 9) system (optional)

## Fallback step 7: Update your DB2 9 WLM environment for XSR\_COMPLETE

If you use the SYSPROC.XSR\_COMPLETE stored procedure in DB2 9, then after falling back, you must update the Java Language Environment (JAVAENV) file of the WLM environment that you use for running XSR\_COMPLETE.

### Procedure

To update your DB2 9 WLM environment for XSR\_COMPLETE:

Ensure that the WLM environment that is used for running XSR\_COMPLETE is updated to use the DB2 9 code paths. The following parameters in the JAVAENV data set for the WLM environment are affected:

- DB2\_BASE
- JCC\_HOME
- JAVA\_HOME

---

## Implications of falling back

Before you fall back to your previous DB2 version, consider the implications of doing so.

### Data sharing

If any member of a data sharing group needs to fall back, consider the implications for data sharing. For more information about falling back in a data sharing environment, see *Falling back in a data sharing environment*.

### Frozen objects

Falling back does not undo changes that the migration process made to the catalog. DB2 uses the migrated catalog after fallback. Some objects in this catalog that have been affected by DB2 10 function might become *frozen* objects after fallback. Frozen objects are unavailable, and they are marked with the release dependency marker O. If an object is marked with a release dependency, it remains marked forever. The release dependency marker is listed in the IBMREQD column of catalog tables. The following table lists the objects that are frozen when you fall back to a previous release.

Table 86. Objects that are frozen after fallback

RELEASE DEPENDENT MARK = O
<ul style="list-style-type: none"><li>• Plans, packages, or views that use any new syntax, objects, or bind options</li><li>• DBRMs that are produced by a precompile in DB2 10 with a value of V10 for the NEWFUN option and when any new DB2 10 functions are being used</li><li>• Any package that contains a statement with CHAR(<i>decimal</i>), if you rebind the package in DB2 10 and you migrated to DB2 10 with the BIF_COMPATIBILITY subsystem parameter set to CURRENT.</li></ul>

Plans and packages become frozen objects when they use new SQL syntax, use new BIND options and attributes, or reference frozen objects. When plans and packages become frozen objects, the automatic rebind process is adversely affected.

**GUIP** After falling back, you can determine if any of your objects are frozen by issuing the following statement:

```
SELECT * FROM catalog table  
WHERE IBMREQD = '0'
```

**GUIP**

## SQL syntax

When you fall back to Version 8 or DB2 9, you cannot use DB2 10 SQL syntax. In DB2 10, you can run the DB2 precompiler or DB2 coprocessor on your applications with option NEWFUN(V8) to determine whether they contain syntax that is newer than Version 8. You can run the DB2 precompiler or DB2 coprocessor on your applications with option NEWFUN(V9) to determine whether they contain syntax that is newer than DB2 9.

## Automatic rebind

After fallback, if you specified YES or COEXIST for the ABIND subsystem parameter, plans or packages that are bound in DB2 10 are automatically rebound on their first execution in Version 8 or DB2 9. If you specified NO for the ABIND subsystem parameter, this automatic rebind fails.

The automatic rebind also fails if you try to use plans or packages that are frozen. To make available the plans and packages that are not automatically rebound, change the SQL statements or remove the reference to a frozen object, precompile the application programs, and explicitly bind the plans and packages on Version 8 or DB2 9.

After fallback, you need to rebind SPUFI. You might need to bind SPUFI with ENCODING(EBCDIC) to avoid an error message.

## Administrative task scheduler tasks

After fallback, all tasks that are managed by the administrative task scheduler in DB2 10 are not manageable by the administrative task scheduler in Version 8 or DB2 9 because of the higher task version. Use ADMIN\_TASK\_ADD in Version 8 or DB2 9 to delete and reinsert all tasks. You can use the ADMIN\_TASK\_LIST table user-defined function to read and store the characteristics of the tasks in a user table before you fall back.

## Database metadata stored procedures

In DB2 10, the DB2 database metadata stored procedures have new Unicode load modules.

Table 87. Database metadata stored procedures and corresponding Unicode load modules

Stored procedure name	Unicode load module
SYSIBM.SQLCOLPRIVILEGES	DSNACPRU
SYSIBM.SQLCOLUMNS	DSNACOLU
SYSIBM.SQLFOREIGNKEYS	DSNAFNKU
SYSIBM.SQLFUNCTIONCOLS	DSNAFCOU
SYSIBM.SQLFUNCTIONS	DSNAFUNU

Table 87. Database metadata stored procedures and corresponding Unicode load modules (continued)

Stored procedure name	Unicode load module
SYSIBM.SQLGETTYPEINFO	DSNATYPU
SYSIBM.SQLPRIMARYKEYS	DSNAPRKU
SYSIBM.SQLPROCEDURECOLS	DSNAPCOU
SYSIBM.SQLPROCEDURES	DSNAPRCU
SYSIBM.SQLSPECIALCOLUMNS	DSNASPCU
SYSIBM.SQLSTATISTICS	DSNASTAU
SYSIBM.SQLTABLEPRIVILEGES	DSNATBPU
SYSIBM.SQLTABLES	DSNATBLU
SYSIBM.SQLUDTS	DSNAUDTU
DSNACLRLU DLL (for remote procedure)	DSNACLRLU

When you run job DSNTIJRT after migrating to conversion mode, it drops the EBCDIC-encoded versions of these stored procedures, and re-creates them as Unicode-encoded. Therefore, if you fall back after running job DSNTIJRT and you use the DB2 database metadata stored procedures, you need to make the DB2 10 load modules available to this DB2 subsystem and other members of the data sharing group.

To make your DB2 10 load modules available to this DB2 subsystem and other members of the data sharing group, complete one of the following tasks:

- Copy the DB2 10 load modules that are listed above into the Version 8 or DB2 9 *prefix.SDSNLOAD* libraries.
- Include the DB2 10 *prefix.SDSNLOAD* library in the STEPLIB of the WLM startup procedure for the database metadata stored procedures.

## Other implications of falling back

Before you fall back to Version 8 or DB2 9, be aware of the following considerations:

### Reactive governing

If you decreased ASUTIME values in the resource limit facility to account for the fact that the resource limit facility does not accumulate ASUTIME across SQL statement boundaries in DB2 DB2 10, you need to increase the ASUTIME values to avoid getting -905 errors.

### TEMP database

**From V8** If you dropped the TEMP database in conversion mode from Version 8, you need to re-create the TEMP database. Otherwise, applications that use the TEMP database fail in DB2 Version 8. **From V8**

### Private protocol

In Version 10, if you explicitly rebind a package or plan that was bound with DBPROTOCOL(PRIVATE) in a previous version of DB2, the object is rebound with the DBPROTOCOL(DRDA) bind option. If you fall back from DB2 10, the package or plan retains the DBPROTOCOL(DRDA) setting. If you want to run the object with private protocol in the fallback release, you must explicitly rebind it with DBPROTOCOL(PRIVATE).

### Subgroup attachment

Subgroup attachment can be used after fallback only if you used the DB2 10 early code when you defined the DB2 subsystem to z/OS.

### Related concepts:

Falling back and remigrating in a data sharing environment

 Automatic rebinds (DB2 Application programming and SQL)

---

## Remigrating

Remigrating (returning to DB2 10 after falling back to Version 8 or DB2 9) is simpler than the initial migration process.

### Before you begin

Before you remigrate, refer to “Changes that might affect your migration from Version 8” on page 45 or Changes that might affect your migration from DB2 9 because many of those considerations apply to remigrations, too. Whether each consideration applies to your subsystem depends on the type of activity that occurred on your Version 8 or DB2 9 subsystem after fallback.

A plan or package is automatically rebound in DB2 10 when it is executed for the first time after remigration if it was not explicitly bound in Version 8 or DB2 9. However, if you set subsystem parameter ABIND to NO in a data sharing or non-data sharing environment, or to COEXIST in a data sharing environment, automatic rebinds after remigration are disabled. This means that the plan or package from your previous release is the one that runs in DB2 10.

**Recommendation:** Avoid automatic rebinds during migration and remigration. After your remigrated system is stable, you can rebind your packages with PLANMGMT(EXTENDED). If a new package does not perform adequately, you can rebind with SWITCH(PREVIOUS) to return to the old package.

### Procedure

To remigrate your subsystem to DB2 10:

1. Check the integrity of your Version 8 or DB2 9 catalog and directory:
  - Run the DSN1COPY utility with the CHECK option on your catalog table spaces.
  - Run the link checker utility, DSN1CHKR, to ensure that no existing links are broken.
  - Run the queries in member DSNTESQ of *prefix.SDSNSAMP*.
2. Optional: Ensure that your Version 8 or DB2 9 DSNTIJIC job has been modified to copy new DB2 10 catalog table spaces, and then use DSNTIJIC to take an image copy of your Version 8 or DB2 9 catalog. This step is not required, but it is recommended.
3. Stop your Version 8 or DB2 9 subsystem.
4. Reconnect TSO, IMS, and CICS to DB2. Re-establish your DB2 10 logon procedures and JCL, as well as your DB2 10 CICS and IMS connections.
5. Rebuild DB2 10 cataloged procedures. Rename the DB2 10 procedures that were renamed by job DSNTIJFV during fallback. If job DSNTIJFV was not run, you need to rerun job DSNTIJMV. Comment out step 1 (DSNTIMP), which defines DB2 10 to z/OS, and run the job. (You do not need to define DB2 10 to z/OS a second time.)



6. Start DB2 10. Ensure that you are using your DB2 10 subsystem parameter load module.
7. Take an image copy of the DB2 10 catalog by using the DSNTIJIC job.
8. Verify your DB2 10 system.
- 9.

**From V9.1**

If you used the SYSPROC.XSR\_COMPLETE stored procedure in DB2 9, ensure that the WLM environment that is used for running XSR\_COMPLETE is updated to use the DB2 10 code paths. The following parameters in the Java Language Environment (JAVAENV) data set for the WLM environment are affected:

- DB2\_BASE
- JCC\_HOME
- JAVA\_HOME

**From V9.1**

**Related tasks:**

Migration step 2: Verify the integrity of DB2 table spaces

Migration step 5: Take image copies of the directory and catalog: DSNTIJIC

Migration step 30: Verify your DB2 10 conversion mode (from Version 8 or Version 9) system (optional)

---

## Migrating your DB2 subsystem to new-function mode

After you migrate your DB2 subsystem to conversion mode (from Version 8 or Version 9), you must complete the migration to DB2 10 new-function mode by migrating the catalog.

### About this task

**Important:** After you begin enabling-new-function mode (from Version 8 or Version 9), you cannot fall back to the previous release.

In a data sharing group, you complete this task only one time on a single member. Other members can be active when you complete this task, but all active members must be running in DB2 10 conversion mode (from Version 8 or Version 9).

### Procedure

To migrate from conversion mode (from Version 8 or Version 9) to new-function mode:

1. Migrate from conversion mode (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9). The following table summarizes that steps of this task:

*Table 88. Overview of steps for migrating to DB2 10 enabling-new-function mode*

Step	Description	Job
1	Run installation CLIST using ENFM option.	(none)
2	Take an image copy of your DB2 10 catalog.	DSNTIJIC
3	Convert the DB2 DB2 10 catalog and directory.	DSNTIJEN

- a. Run the installation CLIST with the ENFM option. During enabling-new-function mode (from Version 8 or Version 9) processing, the CLIST generates installation jobs DSNTIJCS, DSNTIJEN, DSNTIJES, DSNTIJNF, DSNTIJNG, and DSNTIJNH, and customizes the DB2 10 IVP jobs.

**From V8** If you migrated from Version 8, the CLIST also generates job DSNTIJNX. **From V8**

- b. Create the following copies for backup purposes:
  - An image copy of the DB2 catalog and directory, using your site's backup and recovery procedure. You cannot use this image copy to do a point-in-time recovery of the catalog and directory table spaces, because of table space attribute changes during enabling-new-function mode.
  - **Optional:** A full DFDSS backup of the DB2 subsystem.
- c. Run installation job DSNTIJEN. Avoid updates to the DB2 catalog and directory while job DSNTIJEN is running.

**Important:** Job DSNTIJEN converts DB2 to enabling-new-function mode (from Version 8 or Version 9), from which you cannot fall back. Do not run DSNTIJEN until you are certain that you will not need to fall back. After job DSNTIJEN finishes, catalog migration is complete. You can then run job DSNTIJNF to move the subsystem to new-function mode.

2. Complete enabling-new-function mode (from Version 8 or Version 9) processing. For details, see Completing enabling-new-function mode (from Version 8 or Version 9) processing.
3. Migrate from enabling-new-function mode (from Version 8 or Version 9) to new-function mode. For details, see Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode.

## What to do next

### Related concepts:

**From V8** Migration modes for DB2 8 to DB2 10 **From V8**

**From V9.1** Migration modes for DB2 9 to DB2 10 **From V9.1**

### Related tasks:

Migration step 5: Take image copies of the directory and catalog: DSNTIJIC  
Tailoring DB2 jobs to your environment using the installation CLIST

## Implications of migrating to DB2 10 new-function mode

As you prepare to migrate to DB2 10 new-function mode, be aware that some changes in enabling-new-function mode (from both Version 8 and Version 9) and new-function mode might affect your migration.

The following changes apply to migration to new-function mode.

### Archive logs must not be changed to use DFSMS extended format before migration to new-function mode

**From V8**

DB2 10 supports the use of DFSMS striped or compressed extended format archive logs. If you are migrating from DB2 Version 8 and plan to use extended format

archive logs, do not make this change until after migration to new-function mode. In a coexistence environment, you might encounter archive log read failures because DB2 Version 8 cannot read DFSMS extended format archive logs. Disaster recovery systems and all DB2 subsystems in a data sharing group must be in DB2 10 new-function mode before you use extended format archive logs.

From V8

### **Change data capture cannot be enabled on catalog tables during enabling-new-function mode (from Version 8 or Version 9)**

During enabling-new-function mode (from both Version 8 and Version 9) processing, change data capture is disabled on the SYSPACKSTMT catalog table. You should not re-enable change data capture until your DB2 subsystem is in DB2 10 new-function mode. If change data capture is enabled on other tables then change data capture should be disabled before migration to DB2 10 conversion mode (from Version 8 or Version 9).

### **DB2 ignores the LOAD and REORG parameter KEEPDICTIONARY when tables are converted to reordered row format**

By default, DB2 ignores the LOAD and REORG parameter KEEPDICTIONARY when tables are converted from basic row format to reordered row format in DB2 10 new-function mode. If you want the KEEPDICTIONARY parameter to be honored, you need to set subsystem parameter HONOR\_KEEPPDICTIONARY to YES.

### **User-specified application defaults load module is allowed**

In DB2 10 new-function mode, you can specify an application defaults module to load instead of DSNHDECP. However, you should always have at least one module that has the name DSNHDECP because some applications might continue to have a dependency on the DSNHDECP name. You should not use this capability to specify your own application defaults load module in production until you have thoroughly tested the capability on a test system. To ensure fallback capability, you cannot modify applications to load an application defaults load module with a name other than DSNHDECP until your subsystem is in new-function mode.

### **Update to STMT\_ID column of SYSIBM.SYSPACKSTMT table**

After processing in enabling-new-function mode (from Version 8 or Version 9) is complete, the STMT\_ID column of the SYSIBM.SYSPACKSTMT catalog table is populated for existing rows in the table. The SYSIBM.SYSPACKSTMT table is not synchronized with the DB2 directory in SPT01 until you rebind the existing package.

Also, any packages for static SQL statements that existed prior to DB2 10 must be rebound for any user who wants to use enhanced messages and traces that provide statement identifier information.

### **Changes to CREATE TABLE and ALTER TABLE statements for XML columns**

When a table with XML columns is created by a CREATE TABLE or CREATE TABLE LIKE statement in DB2 10 new-function mode, and the table is created in a universal table space, the XML columns and their associated XML tables are created in the XML versioning format. Prior to new-function mode, the XML columns and their associated XML tables are not created in the XML versioning format.

Also, when an ALTER TABLE ADD statement is used to add an XML column to a table in DB2 10 new-function mode, and the table is created in a universal table

space, the XML column and the associated XML table are created in the XML versioning format if it is the first XML column in the table or if all the XML columns in the table are in the XML versioning format.

### **SYSDATE interpreted as synonym for CURRENT\_TIMESTAMP(0)**

In DB2 10 conversion mode (from both Version 8 and Version 9), references to SYSDATE as an ordinary identifier result in SQLCODE -4700. In DB2 10 new-function mode, references to SYSDATE as an ordinary identifier are interpreted as synonyms for CURRENT\_TIMESTAMP(0).

### **Changes to CURRENT\_TIMESTAMP special register**

In DB2 10 conversion mode (from both Version 8 and Version 9), references to CURRENT\_TIMESTAMP in a function call result in SQLCODE -4700. In DB2 10 new-function mode, references to CURRENT\_TIMESTAMP(*integer*) are interpreted as references to the new CURRENT\_TIMESTAMP special register.

### **Different result data type might be returned for ADD\_MONTHS and LAST\_DAY functions**

Before DB2 10 new-function mode, the ADD\_MONTHS and LAST\_DAY functions always return a result of the DATE data type. After migration to new-function mode, these functions return a result data type that is determined from the data type of the input argument. In some cases, this result data type is TIMESTAMP WITHOUT TIME ZONE or a string.

### **New data type for labeled duration SECONDS**

Before DB2 10 new-function mode, labeled duration SECONDS values are expressed as DECIMAL (15,0) numbers. After migration to new-function mode, labeled duration SECONDS values are expressed as a DECIMAL (27,12) number.

### **Changes to SECOND, TIMESTAMP, and TIMESTAMP\_FORMAT built-in functions**

If you have implemented SECOND, TIMESTAMP, or TIMESTAMP\_FORMAT user-defined functions, after migration to DB2 10 new-function mode, built-in functions SECOND, TIMESTAMP, and TIMESTAMP\_FORMAT either allow additional arguments or the argument allows additional data types. If the user-defined function name is not qualified and SYSIBM precedes the function's schema in the SQL path, the built-in functions might be invoked instead of the user-defined function.

### **New LENGTH and SCALE values for TIMESTAMP data type**

Before DB2 10 new-function mode, TIMESTAMP columns have a length of 10 bytes and a scale of 0. After migration to new-function mode, the length of a TIMESTAMP column can be 7 - 13 bytes, and the scale can be 0 - 12. However, rows that previously existed continue to have a length of 10 and scale of 0, and an assumed timestamp precision of 6 digits for fractional seconds. This incompatibility applies to the following catalogs: SYSCOLUMNS, SYSCOLUMNS\_HIST, SYSDATATYPES, SYSKEYTARGETS, SYSKEYTARGETS\_HIST, and SYSPARMS.

### **Catalog and directory tables moved to partition-by-growth table spaces**

Each table in the following table spaces is moved to its own partition-by-growth table space in new-function mode: DSNDB06.SYSOBJ, DSNDB06.SYSDBASE, DSNDB06.SYSVIEWS, DSNDB06.SYSPLAN, DSNDB06.SYSPKAGE, DSNDB06.SYSDBAUT, DSNDB06.SYSGROUP, DSNDB01.DBD01, and DSNDB01.SPT01. Each table space uses row-level locking, and all tables are in reordered-row format.

## **Some user-defined tables now part of the catalog**

In previous versions, SYSIBM.SYSDUMMYA, SYSIBM.SYSDUMMYE, and SYSIBM.SYSDUMMYU tables are user-defined and created as part of the DSNTIJSG job. After migration to new-function mode, these tables are part of the DSNDB06 catalog.

## **Some statements stored in new LOB columns**

After migration to new-function mode, SQL statements that were previously stored in text columns of SYSVIEWS.TEXT, SYSTRIGGERS.TEXT, SYSROUTINES\_SRC.CREATEMST, and SYSPACKSTMT.TEXT are now stored in new LOB columns.

## **Links are removed**

As of new-function mode, all links in the catalog and directory are removed.

## **Change after unloading tables with XML and LOB data to a spanned record data set**

There might be an incompatible change after migration to new-function mode for existing applications that read the output data set created by the UNLOAD utility. The application might need to be modified to read the data set because the data set record format is VBS.

## **DDL statements with LOB columns inherit length from LOB\_INLINE\_LENGTH**

After migration to new-function mode, existing applications inherit the inline length value from subsystem parameter LOB\_INLINE\_LENGTH if they have CREATE TABLE statements with LOB columns or ALTER TABLE statements that add LOB columns. However, if you maintain the default setting of 0 for LOB\_INLINE\_LENGTH, then LOB columns continue to be created with no inline attribute by default. Also, if the inline length from the subsystem parameter exceeds the page size of an explicitly or implicitly created universal table space, the LOB column does not inherit the subsystem parameter value.

## **Possible change to volume selection order**

Due to improvements in the DB2 record retrieval process, the order in which DB2 selects volumes for storage groups in conversion mode (from Version 8 or Version 9) might be different from the order in which DB2 selects volumes in new-function mode.

## **More space required for SPT01 table space**

When you convert to new-function mode, a portion of the contents of the SPT01 table space is moved into a LOB table space. Data in the LOB table space cannot be compressed, so the amount of space that the SPT01 table space requires in new-function mode is greater than the amount of space that SPT01 requires in enabling-new-function mode (from Version 8 or Version 9). However, by default, DB2 places most of the LOB data for SPT01 in the base table space, which can be compressed. Therefore, the amount of space that is required for the SPT01 table space does not increase significantly when you convert to new-function mode. However, if you set the SPT01\_INLINE\_LENGTH subsystem parameter to a smaller value, the amount of space that is needed for SPT01 increases because more data is in the LOB table space. You should not need to decrease the SPT01\_INLINE\_LENGTH value unless the size of SPT01 is close to its 64 GB limit.

## Migrating from conversion mode (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

After you complete the migration process from Version 8, DB2 is in conversion mode from Version 8. After you complete the migration process from DB2 9, DB2 is in conversion mode from Version 9. During conversion mode (from Version 8 or Version 9), you cannot use any DB2 10 new functions.

### Procedure

To migrate from conversion mode (from Version 8 or Version 9) to DB2 10 enabling-new-function mode (from Version 8 or Version 9):

1. Run the installation CLIST again with ENFM specified for the INSTALL TYPE field on panel DSNTIPA1.

The value of the INPUT MEMBER NAME field is the value that you specified as the output member during migration to conversion mode (from Version 8 or Version 9). In a data-sharing environment, it is the output member of the first group member to migrate to conversion mode (from Version 8 or Version 9). In DB2 10 enabling-new-function mode (from both Version 8 and Version 9), the CLIST customizes the installation jobs DSNTIJEN, DSNTIJNF, DSNTIJNG, DSNTIJCS, and DSNTIJES, as well as the DB2 10 sample jobs.

2. Press ENTER to continue to panel DSNTIPT.
3. On panel DSNTIPT, choose the output SDSNSAMP data set. If you use the same data set name, it is not deleted or reallocated. You can only change the value of SAMPLE LIBRARY on this panel.
4. Press ENTER to continue.

Panel DSNTIP00 is displayed.

```
DSNTIP00          ENABLE NEW FUNCTION MODE FOR DB2
====>

Enter storage management properties for defining ENFM image copy data sets:
      DEVICE      DATA CLASS      MGMT CLASS      STOR CLASS
      -----      -
1 IMAGE COPY  ===>      ===>      ===>      ===>

Enter the data set prefix for the ENFM image copy data sets:
2 PREFIX      ===>
```

PRESS: ENTER to continue RETURN to exit HELP for more information

Figure 78. Enable new-function mode for DB2 panel: DSNTIP00

5. Review the image copy data set properties in the IMAGE COPY and PREFIX fields and update as required. The device type must be 1 - 8 alphanumeric characters. The value in the PREFIX field must follow z/OS standards for naming data sets.
6. Press ENTER to continue.

**Related concepts:**

From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

**Related reference:**

DSNTIPA1: Main panel

DSNTIPT: Data set names panel 1

 CATENFM (DB2 Utilities)

## Completing enabling-new-function mode (from Version 8 or Version 9) processing

You must complete several processing actions while your DB2 subsystem is in enabling-new-function mode (from Version 8 or Version 9), which is the mode between conversion mode (from Version 8 or Version 9) and new-function mode. New DB2 functions are not available when your DB2 subsystem is in enabling-new-function mode (from Version 8 or Version 9).

### About this task

**Attention:** After you begin enabling-new-function mode (from Version 8 or Version 9), you cannot fall back to your previous release. However, you can revert to DB2 10 conversion mode\* (from Version 8 or Version 9) if necessary.

### Procedure

To complete enabling-new-function mode (from Version 8 or Version 9) processing:

1. Take an image copy of the DB2 catalog and directory.

This step must be completed before running DSNTIJEN for the first time.

- 2.

From V8

If you had a user-managed real-time statistics database in your previous release, make it accessible so that DSNTIJEN can copy it.

If you do not want the real-time statistics database of your previous release to be copied, delete it because it is not used after completion of DSNTIJEN. If you do not have a user-defined real-time statistics database (DSNRTSDB) defined, DSNTIJEN issues a warning for step ENFM1100 and skips execution of steps ENFM1103 and ENFM1105.

From V8

3. Create shadow data sets for user-defined indexes on the DB2 catalog that reside on user-managed storage.

You must create shadow data sets for user-defined indexes that are on user-managed storage before you run job DSNTIJEN. DB2 uses these shadow

data sets in the REORG steps that convert the catalog table spaces to new-function mode. One of the queries in job DSNTIIPM identifies the affected indexes.

4. Run job DSNTIJEN in LOCALSITE mode. If you run DSNTIJEN in REMOTESITE mode, it fails with an error message.

**Recommendation:** Do not manually reorganize a table space or rebuild indexes on tables in that table space before the migration job step (ENFM0nn7) for that table space is complete.

If you need to restart job DSNTIJEN, you can do so at any time. Always restart the whole job; do not use step restart. Job DSNTIJEN automatically locates and resumes processing of the first table space that was not completely processed. Job steps ENFM000A and ENFM000B automatically detect and copy any DB2 catalog and directory table spaces that were left in COPY-pending or informational COPY-pending status when DSNTIJEN previously ended. If you need to determine how much of the enabling-new-function mode process has completed, use the DISPLAY GROUP DETAIL command.

If the job fails at a table space migration step (ENFM0nn7) because of an unrecoverable sort program work space shortage, use one of these options:

- Increase the number of temporary data sets indicated by the SORTNUM option of the REORG TABLESPACE control statement in the failing step.
- Remove the SORTNUM and SORTDEVT options of the REORG TABLESPACE control statement, and allocate sort work (SORTWKxx) files in the failing step.

Expect a return code of 1 from job steps ENFM0020 and ENFM0030, which convert the SPT01 and DBD01 directory table spaces. Directory objects do not have DDL invoked, so their enabling-new-function mode conversion is different from the conversion for catalog table spaces, which uses DDL. Job steps ENFM0010 and ENFM0040, which process the SYSUTILX and SYSLGRNX directory table spaces, end with a return code of 0 because no conversion is performed.

#### From V8

During copying of the user-defined real-time statistics database to the DB2-defined real-time statistics database (job steps ENFM1103 and ENFM1105), DB2 might issue message DSNT501I with reason code 00C90080. You can ignore this message.

#### From V8

5. Take an image copy of the DB2 catalog and directory after job DSNTIJEN has completed processing.
6. Optional: Run job DSNTIICI to run the CHECK INDEX utility on all the catalog and directory indexes that were modified or added by job DSNTIJEN.

**Related reference:**

 CATENFM (DB2 Utilities)

## Job DSNTIJEN

Job DSNTIJEN converts DB2 to enabling-new-function mode (from Version 8 or Version 9) or enabling-new-function mode\* (from Version 8 or Version 9).

In general, job DSNTIJEN completes the following functions:

- Saves the current RBA or LRSN in the BSDS.



- Changes types and lengths of existing catalog columns.
- Migrates a number of catalog tables from shared table spaces into dedicated table spaces.

**From V8**

If you migrated from Version 8, DSNTIJEN also copies the RTS from the user table spaces to new table spaces in the catalog.

**From V8**

DSNTIJEN migrates catalog tables from shared table spaces into dedicated table spaces as follows.

*Table 89. Shared table spaces that are converted to dedicated table spaces in DB2 10*

Table space name in Version 8 and DB2 9	Corresponding table space names in DB2 10
SYSDBASE	SYSTSAU SYSTSCOL SYSTSTSP SYSTSTPT SYSTSTAB SYSTSIXS, SYSTSIXT <sup>1</sup> , SYSTSIXR <sup>1</sup> SYSTSIPT SYSTSREL SYSTSFOR SYSTSSYN SYSTSFLD SYSTSTAU SYSTSKEY
SYSDBAUT	SYSTSDBA SYSTSDBU
SYSGROUP	SYSTSSTG SYSTSVOL
SYSOBJ	SYSTSAUX SYSTSCON SYSTSDAT SYSTSDEP SYTSENV SYTSKYC SYTSPRM SYTSPRAU SYTSPROU, SYSPLUXA <sup>1</sup> , SYSPLUXB <sup>1</sup> SYTSSCM SYTSTBC SYTSTRG, SYTSTRT <sup>1</sup>
SYSPKAGE	SYTSPKL SYTSPLY SYTSPKG SYTSPKS, SYTSPKX <sup>1</sup> , SYTSPVR <sup>1</sup> SYTSPKY SYTSPKD SYTSPKA

Table 89. Shared table spaces that are converted to dedicated table spaces in DB2 10 (continued)

Table space name in Version 8 and DB2 9	Corresponding table space names in DB2 10
SYSPLAN	SYTSPLN SYTSPLA SYTSDBR SYTSPLD SYTSSTM
SYSVIEWS	SYTSVVEW, SYTSVWT <sup>1</sup> , SYTSVTR <sup>1</sup> SYTSVWD
1. This is an LOB table space.	

DSNTIJEN consists of the following job steps:

**ENFM0000**

Terminates pending DSNENFM.\* utilities.

**ENFM000A**

Gets a list of table spaces that are in ICOPY and COPY status.

**ENFM000B**

Image copies table spaces that are identified in job step ENFM000A.

**ENFM0001**

Updates the catalog for the new release.

**ENFM0010**

Enabling-new-function mode for SYSUTILX.

**ENFM0020**

Checks the new-function mode status of SPT01.

**ENFM0021**

Cleans up data sets for SPT01 conversion.

**ENFM0027**

Converts SPT01 to new-function mode.

**ENFM0028**

Cleans up data sets for SPT01 post-conversion.

**ENFM0029**

Image copies new table spaces from SPT01.

**ENFM0030**

Checks the new-function mode status of DBD01.

**ENFM0031**

Cleans up data sets for DBD01 conversion.

**ENFM0037**

Converts DBD01 to new-function mode.

**ENFM0038**

Cleans up data sets for DBD01 post-conversion.

**ENFM0039**

Image copies new table spaces from DBD01.

**ENFM0040**

Enabling-new-function mode for SYSLGRNX.

| **ENFM0050**  
| Checks the new-function mode status of SYSDBASE.

| **ENFM0051**  
| Cleans up data sets for SYSDBASE conversion.

| **ENFM0057**  
| Converts SYSDBASE to new-function mode.

| **ENFM0058**  
| Cleans up data sets for SYSDBASE post-conversion.

| **ENFM0059**  
| Image copies new table spaces from SYSDBASE.

| **ENFM0060**  
| Checks the new-function mode status of SYSDBAUT.

| **ENFM0061**  
| Cleans up data sets for SYSDBAUT conversion.

| **ENFM0067**  
| Converts SYSDBAUT to new-function mode.

| **ENFM0068**  
| Cleans up data sets for SYSDBAUT post-conversion.

| **ENFM0069**  
| Image copies new table spaces from SYSDBAUT.

| **ENFM0070**  
| Checks the new-function mode status of SYSGROUP.

| **ENFM0071**  
| Cleans up data sets for SYSGROUP conversion.

| **ENFM0077**  
| Converts SYSGROUP to new-function mode.

| **ENFM0078**  
| Cleans up data sets for SYSGROUP post-conversion.

| **ENFM0079**  
| Image copies new table spaces from SYSGROUP.

| **ENFM0080**  
| Checks the new-function mode status of SYSOBJ.

| **ENFM0081**  
| Cleans up data sets for SYSOBJ conversion.

| **ENFM0087**  
| Converts SYSOBJ to new-function mode.

| **ENFM0088**  
| Cleans up data sets for SYSOBJ post-conversion.

| **ENFM0089**  
| Image copies new table spaces from SYSOBJ.

| **ENFM0090**  
| Checks the new-function mode status of SYSPKAGE.

| **ENFM0091**  
| Cleans up data sets for SYSPKAGE conversion.

| **ENFM0097**  
|       Converts SYSPKAGE to new-function mode.

| **ENFM0098**  
|       Cleans up data sets for SYSPKAGE post-conversion.

| **ENFM0099**  
|       Image copies new table spaces from SYSPKAGE.

| **ENFM0100**  
|       Checks the new-function mode status of SYSPLAN.

| **ENFM0101**  
|       Cleans up data sets for SYSPLAN conversion.

| **ENFM0107**  
|       Converts SYSPLAN to new-function mode.

| **ENFM0108**  
|       Cleans up data sets for SYSPLAN post-conversion.

| **ENFM0109**  
|       Image copies new table spaces from SYSPLAN.

| **ENFM0110**  
|       Checks the new-function mode status of SYSVIEWS.

| **ENFM0111**  
|       Cleans up data sets for SYSVIEWS conversion.

| **ENFM0117**  
|       Converts SYSVIEWS to new-function mode.

| **ENFM0118**  
|       Cleans up data sets for SYSVIEWS post-conversion.

| **ENFM0119**  
|       Image copies new table spaces from SYSVIEWS.

| **ENFM9900**  
|       Terminates pending DSNENFM.\* utilities.

| **From V8** 

| If you migrated from Version 8, these additional steps are added to DSNTIJEN  
| when you run the installation CLIST in ENFM mode:

| **ENFM1100**  
|       Starts DSNRTSDB (user-defined RTS database) in read-only mode.

| **ENFM1103**  
|       Loads SYSIBM.SYSTABLESPACESTATS from SYSIBM.TABLESPACESTATS.

| **ENFM1105**  
|       Loads SYSIBM.SYSINDEXSPACESTATS from SYSIBM.INDEXSPACESTATS.

| **ENFM1200**  
|       Switches RTS to catalog tables.

| **From V8** 

## Job DSNTIJCI

Job DSNTIJCI is an optional job that runs the CHECK INDEX utility on each of the DB2 catalog and directory indexes that are modified or added by job DSNTIJEN. Job DSNTIJCI can be run at any time after completion of job DSNTIJEN.

Job DSNTIJCI checks all indexes in the following directory table spaces:

- DSNDB01.DBD01
- DSNDB01.SPT01
- DSNDB01.SYSDBDXA
- DSNDB01.SYSLGRNX
- DSNDB01.SYSSPUXA
- DSNDB01.SYSSPUXB
- DSNDB01.SYSUTILX

Job DSNTIJCI also checks all indexes in the following catalog table spaces:

- DSNDB06.SYSPLUXA
- DSNDB06.SYSPLUXB
- DSNDB06.SYSTSAUX
- DSNDB06.SYSTSCOL
- DSNDB06.SYSTSCON
- DSNDB06.SYSTSDAT
- DSNDB06.SYSTSDBA
- DSNDB06.SYSTSDBR
- DSNDB06.SYSTSDBU
- DSNDB06.SYSTSDEP
- DSNDB06.SYSTSENV
- DSNDB06.SYSTSFAU
- DSNDB06.SYSTSFLD
- DSNDB06.SYSTSFOR
- DSNDB06.SYSTSIPT
- DSNDB06.SYSTSIXR
- DSNDB06.SYSTSIXS
- DSNDB06.SYSTSIXT
- DSNDB06.SYSTSKEY
- DSNDB06.SYSTSKYC
- DSNDB06.SYSTSPKA
- DSNDB06.SYSTSPKD
- DSNDB06.SYSTSPKG
- DSNDB06.SYSTSPKL
- DSNDB06.SYSTSPKS
- DSNDB06.SYSTSPKX
- DSNDB06.SYSTSPKY
- DSNDB06.SYSTSPLA
- DSNDB06.SYSTSPLD
- DSNDB06.SYSTSPLN
- DSNDB06.SYSTSPLY

- DSNDB06.SYSTSPRM
- DSNDB06.SYSTSPVR
- DSNDB06.SYSTSRAU
- DSNDB06.SYSTSREL
- DSNDB06.SYSTSROU
- DSNDB06.SYSTSSCM
- DSNDB06.SYSTSSTG
- DSNDB06.SYSTSSTM
- DSNDB06.SYSTSSYN
- DSNDB06.SYSTSTAB
- DSNDB06.SYSTSTAU
- DSNDB06.SYSTSTBC
- DSNDB06.SYSTSTPT
- DSNDB06.SYSTSTRG
- DSNDB06.SYSTSTRT
- DSNDB06.SYSTSTSP
- DSNDB06.SYSTSVEW
- DSNDB06.SYSTSVOL
- DSNDB06.SYSTSVTR
- DSNDB06.SYSTSVWD
- DSNDB06.SYSTSVWT

Job DSNTIJCI consists of the following job steps:

**DSNCI1**

Checks indexes for the DB2 catalog (DSNDB06).

**DSNCI2**

Checks indexes for DB2 skeleton cursor and skeleton packages table spaces.

**DSNCI3**

Checks indexes for DB2 database descriptor table spaces.

**DSNCI4**

Checks indexes for DB2 system utilities table spaces.

**DSNCI5**

Checks indexes for DB2 log range table spaces.

**Related concepts:**

Job DSNTIJEN

**Related reference:**

 CHECK INDEX (DB2 Utilities)

## Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode

New-function mode can be activated any time after enabling-new-function mode (from Version 8 or Version 9) processing is complete.

## About this task

When the DB2 subsystem is in new-function mode, all DB2 10 function is available for use. From new-function mode, you cannot fall back to your previous version (Version 8 or Version 9.1) or return to conversion mode from Version 8, enabling-new-function mode from Version 8, conversion mode from Version 9, or enabling-new-function mode from Version 9. A DB2 subsystem in DB2 10 enabling-new-function mode (from Version 8 or Version 9) or DB2 10 new-function mode cannot coexist with a Version 8 or Version 9.1 subsystem.

## Procedure

To migrate from enabling-new-function mode (from Version 8 or Version 9) to new-function mode:

1. Run job DSNTIJNF. New-function mode begins after job DSNTIJNF completes successfully.
2. Optional: Check for consistency between catalog tables by running the queries in member DSNTESQ of *prefix.SDSNSAMP*.
3. Optional: Stop DB2 10.
4. After job DSNTIJNF completes successfully, run job DSNTIJNG. Job DSNTIJNG modifies the application defaults load module, *dsnhdcp*, to allow the DB2 precompiler to accept DB2 10 new-function SQL statements by default.
5. If you stopped DB2 before you ran job DSNTIJNG, start DB2 10.
- 6.

### From V8

If you migrated from Version 8, run job DSNTIJNX to bind the packages for SPUFI to enable XML support in new-function mode.

### From V8

7. Run job DSNTIJRT. Job DSNTIJRT executes DSNTIRIN, which installs and customizes all DB2-supplied routines and supporting objects that were deferred until new-function mode. This job was customized when the CLIST was run in MIGRATE mode.
8. Run job DSNTIJRV. Job DSNTIJRV validates all DB2-supplied routines and augments existing installation verification procedures (IVPs) for specific DB2-supplied routines. It also provides a report that identifies successful validations, warnings, and failures. This job was customized when the CLIST was run in MIGRATE mode.
- 9.

### From V9.1

If you used the SYSPROC.XSR\_COMPLETE stored procedure during conversion mode from Version 9, then update the WLM environment that you use for running XSR\_COMPLETE to use DB2 10 class paths:

- a. Edit the Java Language Environment (JAVAENV) data set for the WLM environment by adding the following parameter to the environment variable (ENVAR) list. Change the file and path names to the name of the environment variable that was created when you ran job DSNTIJMV, job step DSNTIJR:  
"`_CEE_ENVFILE=/usr/lpp/db2/db2a10_base/classes/!dsn!envfile.txt`",
- b. Refresh the WLM environment that you use for running XSR\_COMPLETE.

From V9.1

## What to do next

### Recommendations:

- In new-function mode, specify NEWFUN=V10 in your application defaults module. In a data-sharing environment, if you use more than one application defaults module, modify and run the jobs that you use to maintain these modules to specify NEWFUN=V10.
- Alter your DB2 10 buffer pools that have frequent page reads or frequent page writes to use PGFIX YES if you have sufficient real storage available for these buffer pools. Fixing the buffer pages in real storage once and keeping them fixed avoids the processing time that DB2 needs to fix and free pages for each I/O. In some cases, this processing time can be as much as 10% for I/O intensive workloads. To use this option, issue the following command:

GUIP

```
ALTER BPOOL(bpname) VPSIZE(vpsize) PGFIX(YES)
```

Where *bpname* is the name of the buffer pool and *vpsize* is the size of the virtual pool.

GUIP

- If you installed or migrated QMF before migrating the DB2 subsystem, you must rerun some QMF jobs to ensure continued proper operation of QMF. For more information, see Tasks to perform when you upgrade DB2 for z/OS after you install QMF.

### Related concepts:

Job DSNTIJRT

Job DSNTIJRV

From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

### Related information:

## Job DSNTIJNF

Job DSNTIJNF activates new-function mode from conversion mode\* (from Version 8 or Version 9), enabling-new-function mode (from Version 8 or Version 9), or enabling-new-function mode\* (from Version 8 or Version 9).

Job DSNTIJNF contains the following job step:



## ENFM9700

Verifies that the DB2 catalog and directory migration is completed.

### Related concepts:

Job DSNTIJNG

Job DSNTIJRT

Job DSNTIJRV

## Job DSNTIJNG

Job DSNTIJNG must be run during migration to new-function mode to allow the DB2 precompiler to accept DB2 10 new-function SQL statements by default.

DSNTIJNG consists of the following job steps:

### DSNTIZP

Assembles the application defaults load module, *dsnhddec*.

### DSNTIZQ

Link-edits the application defaults load module, *dsnhddec*.

### DSNTIMQ

Completes SMP/E processing for your application defaults load module. Advanced SMP/E skills are recommended for users of job step DSNTIMQ. Read the job step prolog before proceeding. If you want DSNTIJUZ to establish SMP/E GENASM entries in the DB2 system parameter (DSN6xxxx) macros and application defaults load module macros, uncomment job step DSNTIMQ.

### Related concepts:

Job DSNTIJNF

Job DSNTIJRT

Job DSNTIJRV

## Converting EXPLAIN tables for migration from DB2 Version 8

If you migrated from Version 8, convert remaining pre-DB2 10 and EBCDIC-encoded EXPLAIN tables after you migrate to DB2 10 new-function mode.

### About this task

If you run job DSNTIJXA in conversion mode from Version 8, most of the EXPLAIN tables are converted to DB2 10 format. The DSN\_STATEMENT\_CACHE\_TABLE EXPLAIN table is converted to DB2 9 format because the DB2 10 format is not supported in conversion mode from Version 8.

If you ran installation job DSNTIJSG, applied the PTF for APAR PM28500, and then ran DSNTIJXA, the DSN\_PROFILE\_TABLE and DSN\_PROFILE\_HISTORY tables contain a downlevel IPADDR column name. This occurs because renaming of columns is not supported in conversion mode from Version 8.

To convert the table to DB2 10 format, you must run DSNTIJXA again in DB2 10 new-function mode. You can also choose to skip running DSNTIJXA in conversion mode from Version 8 and just run it once in new-function mode to convert all EXPLAIN tables to DB2 10 format. If you skip DSNTIJXA in conversion mode from Version 8, you must also convert the EXPLAIN tables to Unicode encoding after you migrate to new-function mode.

## Procedure

To convert EXPLAIN tables while the subsystem is in new-function mode:

1. Customize and run job DSNTIJPM to identify EXPLAIN tables that need to be removed or converted. Report 14 identifies EBCDIC-encoded EXPLAIN tables. Report 15 identifies EXPLAIN tables that are not in the DB2 10 format.
2. Customize job DSNTIJXA by providing the creator ID of the table or tables to migrate to the DB2 10 format, a DB2 subsystem name, and an authorization ID. To migrate all EXPLAIN tables, specify an asterisk as the creator ID.
3. Run job DSNTIJXA. Job DSNTIJXA calls REXX exec DSNTXTA, which migrates to the DB2 10 format all EXPLAIN tables or EXPLAIN tables that belong to the specified creator ID.
4. If you did not convert EBCDIC-encoded tables to Unicode in conversion mode from Version 8, complete the following steps to migrate all EBCDIC-encoded EXPLAIN tables to Unicode:
  - a. Customize job DSNTIJXB with the following values:
    - A DB2 subsystem name
    - An authorization ID
    - The schema name of the EXPLAIN tables to convert
    - The name of the target database
    - The name of the target 4 KB page table space
    - The name of the target 8 KB page table space
    - The name of the target 16 KB page table space
    - The name of the target 8 KB page LOB table space
    - The name of the target 32 KB page LOB table space
  - b. Run job DSNTIJXB. Job DSNTIJXB calls REXX exec DSNTXTB, which generates DB2 cross-loader control statements and equivalent SQL statements that can be used to copy all EBCDIC EXPLAIN tables under a specified creator ID to Unicode equivalents. All EXPLAIN tables that belong to the specified creator ID must be in the current release format.
  - c. If you have purchased the DB2 Utilities Suite, run job DSNTIJXC to process the control statements that were generated by DSNTIJXB. Otherwise, use the equivalent SQL statements that were generated by DSNTIJXB to convert the tables to Unicode.
  - d. After you convert an EXPLAIN table from EBCDIC encoding to Unicode encoding, check for joins to that table. When you convert EXPLAIN tables to Unicode, applications that join with EXPLAIN tables might have different results because of the CCSID conversion. For more information, see Objects with different CCSIDs in the same SQL statement (DB2 Internationalization Guide).
  - e. Repeat steps a, b, c, and d for each creator that has at least one EBCDIC EXPLAIN table.

---

## Reverting to conversion mode\* (from Version 8 or Version 9) or enabling-new-function mode\* (from Version 8 or Version 9)

In DB2 10, you can revert to conversion mode\* (from Version 8 or Version 9) from enabling-new-function mode\* (from Version 8 or Version 9) or new-function mode. You can also revert to enabling-new-function mode\* (from Version 8 or Version 9) from new-function mode.

## About this task

You can use the reversion process if you encounter problems converting from conversion mode (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9) or new-function mode, or to control access to new function after you migrate to new-function mode. In a data sharing environment, only one member must be active when you complete this task.

### Related concepts:

From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

## Reverting to conversion mode\* (from Version 8 or Version 9)

You can revert from DB2 10 enabling-new-function mode (from Version 8 or Version 9), enabling-new-function mode\* (from Version 8 or Version 9), or new-function mode to DB2 10 conversion mode\* (from Version 8 or Version 9). This action might be necessary if you encounter problems or need to control access to new function.

### About this task

For example, if you encounter problems after you migrate to enabling-new-function mode (from Version 8 or Version 9), you can revert to conversion mode\* (from Version 8 or Version 9) until the problems are resolved.

**Important:** You cannot fall back to Version 8 or DB2 9 from conversion mode\* (from Version 8 or Version 9).

### Procedure

To revert to DB2 10 conversion mode\* (from Version 8 or Version 9):

1. Run job DSNTIJCS.
2. In job DSNTIJNG, ensure that the DSNHDECM invocation specifies NEWFUN=V $x$ , where  $x$  corresponds to the version from which you migrated.
3. Run job DSNTIJNG to rebuild your application defaults load module, *dsnhdcp*.

### Related tasks:

Moving from conversion mode\* (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

Moving from conversion mode\* (from Version 8 or Version 9) to new-function mode

Reverting to enabling-new-function mode\* (from Version 8 or Version 9)

## Reverting to enabling-new-function mode\* (from Version 8 or Version 9)

If your subsystem is in new-function mode but you decide to postpone having users use new DB2 10 functions, you can return to enabling-new-function mode\* (from Version 8 or Version 9). You can also revert to conversion mode\* (from Version 8 or Version 9).

### About this task

**Important:** You cannot fall back to Version 8 or DB2 9 after you have entered enabling-new-function mode (from Version 8 or Version 9) or new-function mode.

### Procedure

To revert to enabling-new-function mode\* (from Version 8 or Version 9):

1. Run job DSNTIJES.

**Important:** This job sets the DB2 mode to the enabling-new-function mode that corresponds with the version from which you migrated (Version 8 or DB2 9).

2. In job DSNTIJNG, ensure that the DSNHDECM invocation specifies NEWFUN=V8 or NEWFUN=V9.
3. Run job DSNTIJNG.
4. Verify that DSNHDECM specifies NEWFUN=V8 if you are reverting to enabling-new-function mode\* from Version 8 or NEWFUN=V9 if you are reverting to enabling-new-function mode\* from Version 9.
5. If you are in a data sharing environment and you use more than one application defaults load module, modify and run the jobs that you use to maintain these load modules to specify NEWFUN=V8 or NEWFUN=V9.

#### Related tasks:

Migrating from enabling-new-function mode\* (from Version 8 or Version 9) to new-function mode

Reverting to conversion mode\* (from Version 8 or Version 9)

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## Returning to enabling-new-function mode (from Version 8 or Version 9) or new-function mode

You can return to enabling-new-function mode (from Version 8 or Version 9) if you reverted to conversion mode\* (from Version 8 or Version 9). You can return to new-function mode if you reverted to conversion mode\* (from Version 8 or Version 9) or enabling-new-function mode\* (from Version 8 or Version 9).

You can convert to new-function mode only if the DB2 subsystem was previously in enabling-new-function mode (from Version 8 or Version 9) and completed enabling-new-function mode (from Version 8 or Version 9) processing. In a data sharing environment, only one member must be active when you complete this task.

#### Related concepts:

 From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

## Moving from conversion mode\* (from Version 8 or Version 9) to enabling-new-function mode (from Version 8 or Version 9)

From DB2 10 conversion mode\* (from Version 8 or Version 9), you can resume your migration process by migrating to DB2 10 enabling-new-function mode (from Version 8 or Version 9).

### Procedure

To migrate to enabling-new-function mode (from Version 8 or Version 9) from conversion mode\* (from Version 8 or Version 9):

Run job DSNTIJEN.

Whether DSNTIJEN changes DB2 to enabling-new-function mode\* (from Version 8 or Version 9) or enabling-new-function mode (from Version 8 or Version 9) depends on the state of DB2 before you reverted, as shown in the table below.

Table 90. Overview of steps for converting to DB2 10 enabling-new-function mode (from Version 8 or Version 9)

If DB2 reverted to conversion mode* (from Version 8 or Version 9) from...	DSNTIJEN will change DB2 to...
new-function mode	enabling-new-function mode* (from Version 8 or Version 9)
enabling-new-function mode (from Version 8 or Version 9)	enabling-new-function mode (from Version 8 or Version 9) <sup>1</sup>
enabling-new-function mode* (from Version 8 or Version 9)	enabling-new-function mode* (from Version 8 or Version 9)

#### Note:

1. DSNTIJEN also attempts to complete enabling-new-function mode processing if it has not completed.

### Related concepts:

From V8

Migration modes for DB2 8 to DB2 10

From V8

From V9.1

Migration modes for DB2 9 to DB2 10

From V9.1

## Moving from conversion mode\* (from Version 8 or Version 9) to new-function mode

From DB2 10 conversion mode\* (from Version 8 or Version 9), you can resume your migration process by migrating to DB2 10 new-function mode.

### Procedure

To migrate to DB2 10 new-function mode from DB2 10 conversion mode\* (from Version 8 or Version 9):

Run job DSNTIJNF. If enabling-new-function mode processing did not complete when DB2 was previously in enabling-new-function mode (from Version 8 or Version 9), DSNTIJNF issues an error that indicates that you need to run DSNTIJEN.

**Related concepts:**

**From V8**

Migration modes for DB2 8 to DB2 10

**From V8**

**From V9.1**

Migration modes for DB2 9 to DB2 10

**From V9.1**

## Migrating from enabling-new-function mode\* (from Version 8 or Version 9) to new-function mode

After you revert to DB2 10 enabling-new-function mode\* (from Version 8 or Version 9), you can return to DB2 10 new-function mode when you are ready.

### Procedure

To return to new-function mode:

1. Run job DSNTIJNF.
2. In job DSNTIJNG, ensure that the DSNHDECM invocation specifies NEWFUN=V10.
3. Run job DSNTIJNG.
4. If you are in a data sharing environment and you use more than one application defaults load module, modify and run the jobs that you use to maintain these load modules to specify NEWFUN=V10.

**Related concepts:**

**From V8**

Migration modes for DB2 8 to DB2 10

**From V8**

**From V9.1**

Migration modes for DB2 9 to DB2 10

From V9.1





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## Chapter 7. Installing, migrating, and enabling DB2 data sharing

Whether you need to install, migrate, or enable data sharing depends on the type of system that you start with and the type of system that you want to create.

### Before you begin

Familiarize yourself with the following information:

- Planning for DB2 data sharing
- Strategy for creating a DB2 data sharing group
- Preparing for DB2 10 migration in DB2 data sharing

### Procedure

To create or migrate a DB2 data sharing group:

Complete the appropriate task, as described in the following table.

*Table 91. Data sharing options*

If you have this...	And you want this...	Do this...
No system	DB2 10 data sharing	Install a new data sharing group, as described in <a href="#">Installing a new data sharing group</a> .
A DB2 10 non-sharing DB2 subsystem	The originating member of a data sharing group	Enable DB2 data sharing, as described in <a href="#">Enabling DB2 data sharing</a> .
One member in the group	More members in the group	Add new data sharing members, as described in <a href="#">Adding a new data sharing member</a> .
Separate DB2 subsystems	Merged DB2 subsystems into a single group	Merge existing DB2 data into the group, as described in <a href="#">Merging existing DB2 data into the group</a> .
A Version 8 or DB2 9 data sharing group	A DB2 10 data sharing group	Migrate the existing data sharing group to DB2 10, as described in <a href="#">Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)</a> .

#### Related concepts:

[Introduction to DB2 data sharing \(DB2 Data Sharing Planning and Administration\)](#)

#### Related tasks:

[Installing DB2](#)

[Migrating DB2 to DB2 10](#)

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## Strategy for creating a DB2 data sharing group

When you create a data sharing group, add one member at a time. You can install a new DB2 for the first member (the *originating member*), or you can enable an existing DB2 subsystem as the originating member.

### Before you begin

Familiarize yourself with the information in Planning for DB2 data sharing.

### About this task

Enabling DB2 data sharing is a big step. Carefully plan your strategy because data sharing is difficult to disable after it is enabled. Disabling should only be considered if your long-term plans are to disable data sharing. During migration, test other major new capabilities in the new release on a single system before enabling data sharing, and then build and try a test data sharing group. When you are ready to begin a move to production, you must avoid having to fall back to the previous release.

**Tip:** DB2 target library and distribution library data sets can be shared among all members of a data sharing group. Sharing these libraries reduces the effort of installing and maintaining the different members of the data sharing group. Sharing libraries can also help ensure that members are using the same exit routines. Also, sharing libraries simplifies the tasks of defining a new member to a data sharing group. The member installation process supports sharing of the libraries.

### Procedure


Follow this general strategy for creating a data sharing group:


1. Build and try a test data sharing group. Here is one approach to testing your data sharing group:
  - a. Install DB2 10 as a single system, and test it with dummy data, or copies of production data, in order to test some of the new capabilities. Run old applications and begin new application development work. In the meantime, prepare the hardware and define the coupling facility structures to enable data sharing.
  - b. Enable data sharing on the test system. You have a single-system data sharing group at this point, and this can help you find any initial configuration problems. Make sure that old applications work in this environment.
  - c. Install additional members in the test group. Run applications from different members in the group to fully exercise the group buffer pools and cross-system locking.
2. Move to production. When you are ready to move to production complete the following steps:
  - a. If your originating member is not already migrated to DB2 10, migrate it from Version 8 or DB2 9 to DB2 10.


**Recommendation:** Wait until your system is stable before enabling data sharing. You can enable data sharing on your existing release and then migrate to DB2 10, but it is not recommended, particularly if you plan to

- migrate soon. If you are in the process of migrating, wait until DB2 10 enters new-function mode before you move to the data sharing mode.
- b. Verify that the your DB2 10 system is stabilized in new-function mode. Once the system is stabilized, you can begin using new functions.
  - c. Tune applications to contain the level of locking and lock contention rates. To reduce the effects of locking contention in a data sharing environment, first control locking costs in a non-data sharing environment. This gives you a baseline from which to perform further tuning after the move to data sharing.
  - d. Enable data sharing on the originating member, and run applications on this one-member data sharing group.
  - e. Install additional members as needed.


**Related concepts:**

 [Introduction to DB2 data sharing \(DB2 Data Sharing Planning and Administration\)](#)

 [Database administration for data sharing \(DB2 Data Sharing Planning and Administration\)](#)

 [Concurrency and locks in data sharing environments \(DB2 Data Sharing Planning and Administration\)](#)

**Related tasks:**

 [Controlling resource usage \(DB2 Performance\)](#)

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## Subsystem parameters and application defaults in a data sharing environment

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

### Specifying a member's subsystem parameter load module

Every member of a data sharing group must have its own unique load module for subsystem parameters (sometimes called DSNZPARM in a non-data sharing environment).

#### About this task

The load module for subsystem parameters is built by job DSNTIJUZ and stored in the *prefix*.SDSNEXIT target library. Every member must use a different name for its parameter load module because the *prefix*.SDSNEXIT target library can be shared among all members of the data sharing group. The installation process requires that you provide the name of the load module for a member.

**Recommendation:** Name each member's load module using the convention DSNZP*xxx*, where *xxx* includes the number in the member name and the group identifier. For example, DB1A's subsystem parameter load module could be named DSNZP01A.

The subsystem parameter load module name for a member is an optional parameter on the EXEC statement in the JCL procedure that is used to start the *ssnm*MSTR address space. This optional parameter provides support for an

operator (or automated operations) not specifying the subsystem parameter load module name when starting a member.

## Procedure

To specify the subsystem parameter load module for a member:

Specify the load module name in the EXEC statement of the *ssnm*MSTR JCL procedure in SYS1.PROCLIB as follows:

```
//IEFPROC EXEC PGM=DSNYASCP,PARM='ZPARAM(DSNZPxxx)',...
```

### Related concepts:

Subsystem parameter module and application defaults module values

## The scope and uniqueness of DB2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

The values of most parameters do not need to be unique. Recommendations are offered for some of these parameters. In the following tables, the parameter is indicated by the name of the corresponding installation panel field. However, some of the parameters do not reside in the DSNZPxxx load module.

### Parameter values that must be different on each member

The list below shows the values of the installation panel fields that must be different for every member of a data sharing group. You specify values for these fields when a member is installed, migrated, or updated.

- Active Logs: COPY 1 PREFIX
- Active Logs: COPY 2 PREFIX
- Archive Logs: COPY 1 PREFIX (ARCPFX1 parameter)
- Archive Logs: COPY 2 PREFIX (ARCPFX2 parameter)
- Bootstrap Data Sets : COPY 1 NAME
- Bootstrap Data Sets : COPY 2 NAME
- COMMAND PREFIX
- DB2 NETWORK LUNAME
- MEMBER IDENTIFIER
- MEMBER NAME
- PARAMETER MODULE
- PROC NAME
- RESYNC PORT
- SUBSYSTEM NAME
- SUBSYSTEM SEQUENCE
- SUBSYSTEM NAME (IRLM)
- WORK FILE DB

## Parameter values that must be the same on every member

The list below shows the installation panel fields that must have the same values for every member of the data sharing group.

- CATALOG ALIAS
- COMPRESS\_SPT01 parameter in macro DSN6SPRM
- DEL CF STRUCTS
- DBADM CREATE AUTH
- DB2 LOCATION NAME
- DESCRIBE FOR STATIC
- DIRECTORY AND CATALOG DATA
- DIRECTORY AND CATALOG INDEXES
- DRDA PORT
- EVALUATE UNCOMMITTED
- EXTENDED SECURITY
- GROUP ATTACH
- GROUP NAME
- INDEX SPACE ALLOCATION
- IRLM XCF GROUP NAME
- INSTALL DD CONTROL SUPT
- MINIMUM DIVIDE SCALE
- PAD INDEXES BY DEFAULT
- REAL TIME STATS
- RETVLCFK parameter in macro DSN6SPRM
- REVOKE DEP PRIV
- SECURE PORT
- SITE TYPE
- SKIP UNCOMM INSERTS
- STATCLUS parameter in macro DSN6SPRM
- STATISTICS HISTORY
- STATISTICS ROLLUP
- SYSTEM ADMIN 1
- SYSTEM ADMIN 2
- SYSTEM OPERATOR 1
- SYSTEM OPERATOR 2
- SECURITY ADMIN 1
- SEC ADMIN 1 TYPE
- SECURITY ADMIN 2
- SEC ADMIN 2 TYPE
- SEPARATE SECURITY
- TABLE SPACE ALLOCATION
- TCP/IP ALREADY VERIFIED
- TRACKER SITE
- UNICODE IFCIDS
- VARY DS CONTROL INTERVAL

## Other recommendations


The table below shows the installation panel fields that can have the same or different values for members of a data sharing group.

Table 92. Recommended values for installation panel fields

Installation panel field (parameter) name	Recommendation
DEALLOC PERIOD	Do not archive to tape. If you must, however, you should specify 0 for this parameter unless you intend to run all RECOVER jobs from the same member. Specifying a deallocation delay means that the tape is not available to any other member until the deallocation time expires.
DEFAULT 4-KB BUFFER POOL FOR USER DATA DEFAULT 8-KB BUFFER POOL FOR USER DATA DEFAULT 16-KB BUFFER POOL FOR USER DATA DEFAULT 32-KB BUFFER POOL FOR USER DATA DEFAULT BUFFER POOL FOR USER LOB DATA DEFAULT BUFFER POOL FOR USER XML DATA	For consistent results when creating objects on different members, make this default the same on all members.
DEFAULT BUFFER POOL FOR USER INDEXES	For consistent results when creating objects on different members, make this default the same on all members.
DEVICE TYPE 1DEVICE TYPE 2	Archive the first copy of the log to disk.
DISABLE_EDMRTS in macro DSN6SPRM	For consistent results, make the value of this subsystem parameter the same on all members.
EDM LIMIT BELOW THE BAR	If you are migrating from DB2 Version 8 or DB2 9, change the default value of 0 to the EDMPOOL value that you used in DB2 Version 8 or DB2 9.
IMMEDIATE WRITE (IMMEDWRI parameter)	
READ COPY2 ARCHIVE	This option should have the same value (either YES or NO) for all members of the group. Otherwise, the parameter, as it is set on the member that owns the archive log data set, determines which copy is used.
READ TAPE UNITS	Do not archive to tape. If you must, however, it is vital that you have enough tape units allocated to the member doing the recovery to merge the archive logs from all members in the group that have updated the object being recovered. Thus, if there are eight members in the group, make sure you specify at least eight on this panel for each member.
RECORDING MAX	All members should use the maximum value of 10000, making it easier to transfer a workload from one member to another.
RETAINED LOCK TIMEOUT	If you have automatic restart, or some other restart automation that quickly restarts failed members, choose a non-zero value for this parameter.
START IRLM CTRACE	Diagnostic traces should be activated for all members of the group. The negligible performance overhead is outweighed by the benefit of easier problem resolution. Only those systems that have reached the limits of processor capacity should consider not automatically activating these traces.

### Related concepts:

Order-dependent transactions

 The impact of archiving logs in a data sharing group (DB2 Data Sharing Planning and Administration)

### Related reference:

Directory of subsystem parameters, panel fields, and application default values

Subsystem parameters that are not on installation panels

➡ BIND and REBIND options for packages and plans (DB2 Commands)

## Updating subsystem parameters for a member

No group-wide subsystem parameters can be updated; however, you can update the subsystem parameters for an individual member.

### Procedure

To update subsystem parameters for a member of a data sharing group:

Specify the following installation option on the DSNTIPA1 installation panel:

```
INSTALL TYPE ==> UPDATE
```

This option updates parameters for the member.

#### Related concepts:

The scope and uniqueness of DB2 subsystem parameters in data sharing

#### Related reference:

DSNTIPA1: Main panel

## Application defaults parameters

An application defaults load module, *dsnhdcep*, is generated as part of installing or migrating DB2. In a data sharing environment, this module is generated only for the first member that is installed or migrated.

If you provide a separate *dsnhdcep* module for each member, use the same *dsnhdcep* settings (except for the SSID parameter) for all members of the data sharing group. If you provide a separate *dsnhdcep* module for each member, after DB2 enters new-function mode, identify the jobs that you use to maintain those *dsnhdcep* modules. You must modify those jobs to specify NEWFUN=V10, and then run those jobs.

#### Related concepts:

Subsystem parameter module and application defaults module values

---

## Installing a new data sharing group

Although you can install and immediately enable DB2 data sharing on a new DB2 10 member, you should do so only in low-risk situations. The recommended approach is to migrate to, or install, a DB2 10 member, use it for a while, and then enable data sharing.

### Before you begin

Familiarize yourself with the following information:

- Planning for DB2 data sharing
- Strategy for creating a DB2 data sharing group

### About this task

If you decide to install and immediately enable data sharing on a new DB2 10 member, that member becomes the *originating member* of the data sharing group.

This member's DB2 catalog is used as the DB2 catalog for the entire data sharing group.

## Procedure

To install a new data sharing group:

1. On installation panel DSNTIPA1, specify:

```
INSTALL TYPE ==> INSTALL
DATA SHARING ==> YES
```

2. On installation panel DSNTIP0A, specify 1 to indicate the group data sharing function.

3. On installation panel DSNTIPK, specify:

```
GROUP NAME ==> group name
MEMBER NAME ==> originating member name
```

Verify that the *originating member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnmMSTR* startup procedure with the group name and member name you specify here.

4. Complete the installation panels and specify all of the parameters.
5. Complete the installation of DB2 by following the installation steps in Chapter 5, "Installing DB2," on page 509.
6. Run the installation verification procedures (IVP).

### Related concepts:

Subsystem parameters and application defaults in a data sharing environment

The scope and uniqueness of DB2 subsystem parameters in data sharing

Data sharing naming conventions

### Related tasks:

Enabling DB2 data sharing

Invoking the CLIST

### Related reference:

DATA SHARING field (DSHARE subsystem parameter)

---

## Enabling DB2 data sharing

The enabling process allows an existing DB2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

### Before you begin

Familiarize yourself with the following information:

- Planning for DB2 data sharing
- Strategy for creating a DB2 data sharing group

### About this task

**Important:** If you use a product that uses IFCID 0306 to read log data, consult the documentation for that product for information about disabling and re-enabling data sharing.



## Procedure

To enable data sharing:

Complete the following tasks:

### Related concepts:

The scope and uniqueness of DB2 subsystem parameters in data sharing

### Related tasks:

Installing DB2

Renaming a member by stopping DB2

Migration step 9: Stop Version 8 or DB2 9 activity

## Running the CLIST for enabling data sharing

The process of enabling data sharing involves running some of the installation jobs. Before you run the installation jobs, tailor them to your environment by running the installation CLIST.

### About this task

The enabling CLIST tailors the following jobs:

	DSNTEJ0	DSNTEJ3M	DSNTEJ6W	DSNTEJ78
	DSNTEJ1	DSNTEJ3P	DSNTEJ6Z	DSNTESA
	DSNTEJ1L	DSNTEJ4C	DSNTEJ61	DSNTESC
	DSNTEJ1P	DSNTEJ4P	DSNTEJ62	DSNTESD
	DSNTEJ1S	DSNTEJ5A	DSNTEJ63	DSNTESE
	DSNTEJ1T	DSNTEJ5C	DSNTEJ64	DSNTESH
	DSNTEJ1U	DSNTEJ5P	DSNTEJ65	DSNTIJDE
	DSNTEJ2A	DSNTEJ6	DSNTEJ66	DSNTIJFT
	DSNTEJ2C	DSNTEJ6D	DSNTEJ67	DSNTIJGF
	DSNTEJ2D	DSNTEJ6O	DSNTEJ7	DSNTIJIN
	DSNTEJ2E	DSNTEJ6P	DSNTEJ71	DSNTIJMV
	DSNTEJ2F	DSNTEJ6R	DSNTEJ73	DSNTIJTM
	DSNTEJ2H	DSNTEJ6S	DSNTEJ75	DSNTIJUZ
	DSNTEJ2P	DSNTEJ6T	DSNTEJ76	DSNTIJVC
	DSNTEJ2U	DSNTEJ6U	DSNTEJ77	DSN8ES1
	DSNTJE3C	DSNTEJ6V		DSN8ES2

The enabling CLIST also edits the DB2I CLISTs.

## Procedure

To tailor the installation jobs for enabling data sharing:

1. Invoke the installation CLIST.
2. On installation panel DSNTIPA1, specify:

	INSTALL TYPE	====>	INSTALL
	DATA SHARING	====>	YES
	INPUT MEMBER NAME	====>	<i>input member for originating member</i>
	OUTPUT MEMBER NAME	====>	<i>new output member</i>

3. On installation panel DSNTIP0A, specify option 3 to enable data sharing.
4. On installation panel DSNTIPK, specify:
 

```
GROUP NAME ==> group name
MEMBER NAME ==> originating member name
```

 Verify that the *originating member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnmMSTR* startup procedure with the group name and member name that you specify here.
5. Complete the remaining installation panels, specifying parameters according to the DB2 subsystem parameters guidelines.

**Related concepts:**

Subsystem parameters and application defaults in a data sharing environment

**Related tasks:**

Invoking the CLIST

## Stopping DB2 activity

Before running any installation jobs to enable data sharing, ensure that all work is stopped on the subsystem that you chose to be the originating member.

### Procedure

To stop work on DB2:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for DB2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

**GUI**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUI**

The QUIESCE keyword allows DB2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access DB2:

**GUI**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUI**

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct jobs were run for DSNTIJUZ. Ensure that you started DB2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all DB2 9 work is stopped:
  - Make sure no units of recovery remain. Issue the following command:

**GUI**

-DSN1 DISPLAY THREAD(\*) TYPE(\*)

**GUIP**

Then use -DSN1 RECOVER INDOUBT for any indoubt threads.

- Ensure that all utilities are completed or terminated. To ensure that no utility work remains, issue the following command:

**GUIP**

-DSN1 DISPLAY UTILITY(\*)

**GUIP**

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

-DSN1 TERM UTILITY(\*)

- Ensure that no table spaces and index spaces in the DB2 directory (DSNDB01) or the DB2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

**GUIP**

-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(\*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(\*) RESTRICT

**GUIP**

You must have system administrator or system operator authority (specified on installation panel DSNTIPP1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop DB2 by issuing the following command:

**GUIP**

-DSN1 STOP DB2 MODE(QUIESCE)

**GUIP**

A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

**Related reference:**

- [➤ -STOP DB2 \(DB2\) \(DB2 Commands\)](#)
- [➤ -DISPLAY THREAD \(DB2\) \(DB2 Commands\)](#)
- [➤ -DISPLAY UTILITY \(DB2\) \(DB2 Commands\)](#)
- [➤ -TERM UTILITY \(DB2\) \(DB2 Commands\)](#)
- [➤ -DISPLAY DATABASE \(DB2\) \(DB2 Commands\)](#)

## Identifying DB2 to z/OS: DSNTIJMV

Job DSNTIJMV completes some of the steps that are required to identify DB2 to z/OS. These steps include updating members of SYS1.PARMLIB and SYS1.PROCLIB and creating Language Environment options data sets for the DB2 core WLM environment for Java routines.

### About this task

Do not overwrite the entries for DB2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see Program properties table (PPT) (MVS Initialization and Tuning Reference).

### Procedure

To define DB2 to z/OS:

1. Run job DSNTIJMV. If job DSNTIJMV runs successfully, it produces return codes of 0.
2. Review the content of the Language Environment options data set and adjust the following environment variables as needed. The data set is created by DSNTIJMV and must be allocated by the JAVAENV DD of the address space procedure for the DB2 core WLM environment for Java routines.
  - `_CEE_ENVFILE`, if present, needs to be set to the name and path of the environment variable file that was created by job step DSNTIJR.
  - `JVMPROPS` needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
  - `DB2_BASE` and `JCC_HOME` need to be set to the names of the HFS directories that you selected for the DB2 for z/OS and JCC product classes.

### What to do next

z/OS requirements: Each DB2 and each IRLM that you define to z/OS in the IEFSSNxx PARMLIB member requires a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your DB2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs; otherwise, your subsystems might not start. If you need more than 165 LXs, use the NSYSLX option on the z/OS IEASYSxx PARMLIB member to increase this number.


For later diagnosis of IRLM problems, also ensure that the following requirements are met:

- Specify the IRLM dump formatting modules DXRRLM50, DXRRLM55, and DXRRLS55 in a BLSCUSER member in a data set that is in the system's PARMLIB concatenation.
- Copy the DXRRL186, DXRRLFTB, DXRRLM50, DXRRLM55, and DXRRLS55 modules from the IRLM SDXRRESL data set to a data set in the system's link list. Or, add the SDXRRESL data set to the system's link list in a PROGxx member of a data set in the system's PARMLIB concatenation. If you use more than one level of IRLM, you will need to use a STEPLIB concatenation when using IPCS to process dumps that are taken for the levels whose modules are not in the link list.

Additional changes to SYS1.PARMLIB and SYS1.PROCLIB: Because different sites have different requirements for identifying DB2 to z/OS, job DSNTIJMV cannot anticipate all the necessary updates. For this reason, the updates that job DSNTIJMV makes to SYS1.PARMLIB and SYS1.PROCLIB might be incomplete. You might have additional procedures of your own to rename. You can complete these updates either by making the updates directly in SYS1.PARMLIB and SYS1.PROCLIB, or by editing DSNTIJMV.

**Recommendation:** Edit the updates directly in SYS1.PARMLIB instead of submitting the updates in the DSNTIJMV step. For SYS1.PROCLIB, submit the procedure-update section of job DSNTIJMV. Before you make the updates, read the following information and examine job DSNTIJMV to study the updates that it makes. Then use an editor such as ISPF/PDF to make the updates to SYS1.PARMLIB.

**Related concepts:**

 Runtime environment for Java routines (DB2 Application Programming for Java)

## Altering the current active log data sets: DSNTIJIN

When job DSNTIJIN is tailored for enabling a DB2 subsystem to become the originating member of a new data sharing group, it does not define any data sets. It only alters the member's active log data sets to use SHAREOPTIONS (2 3).


### Procedure

To alter the active log data sets:

Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0. Check any VSAM messages carefully.

**Related concepts:**

 Allocating and extending data sets (DB2 Performance)

## Defining DB2 initialization parameters: DSNTIJUZ

| Job DSNTIJUZ generates the DB2 data-only load module DSNHMCID, the  
| application defaults load module (*dsnhdecpl*), and the subsystem parameter module.  
| The application defaults load module is the name that was specified for the APPL  
| DEFAULTS field on installation panel DSNTIPO3. The subsystem parameter  
| module is the name that was specified for the PARAMETER MODULE field on  
| installation panel DSNTIPO3.

### About this task

| Job DSNTIJUZ also executes the change log inventory utility (DSNJU003), which  
| updates the bootstrap data set (BSDS) to enable DB2 data sharing.

### Procedure

To define DB2 initialization parameters:

- | 1. Verify that data sets that are allocated by the SYSLMOD DD statements of this  
| job are also allocated by the STEPLIB DD statements of the DSNMSTR address  
| space for DB2.

2. If the DB2 distribution library prefix is different from the target library prefix, edit DSNTIJUZ to correct the data set name for *prefix*.ADSNLOAD.
3. If you have not run the SMP/E ACCEPT job (DSNACEP1) of FMID HDBAA10, edit DSNTIJUZ to include the SMP/E temporary data set (SMPTLIB) in the concatenation for the ADSNLOAD DD statement in step DSNTIZQ. SMPTLIB is *hlq*.HDBAA10.F2, where *hlq* is from the GLOBAL SMP/E zone. Use the following SMP/E statements to get DSPREFIX:

```
SET BOUNDARY (GLOBAL).
LIST DDDEF ( SMPTLIB ).
```

4. Insert the DSPREFIX value after SDSNLOAD and ADSNLOAD.
5. Run job DSNTIJUZ.

If you want DSNTIJUZ to establish SMP/E GENASM entries in the DB2 system parameter (DSN6xxx) and application defaults module macros, you need to uncomment job step DSNTIMQ. Advanced SMP/E skills are recommended for users of job step DSNTIMQ. Read the job step prolog before proceeding. You might receive message GIM65001 when you run steps DSNTLOG and DSNTIMQ, or you might receive a return code of 4 when you run step DSNTIMQ. You can ignore these messages.

6. If job DSNTIJUZ fails or abends, correct the problem and rerun the job.

**Related reference:**

PARAMETER MODULE field  
 APPL DEFAULTS field

## Recording DB2 data to SMF (optional)

When you enable DB2 data sharing, you can specify whether DB2 statistical, accounting, and audit trace data is to be collected.

### Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
To have DB2 collect statistical information	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
To have DB2 collect accounting information	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
To have DB2 collect auditing information	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, DB2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

DB2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. DB2 can also record other performance data. After you complete the installation process, you can use commands to have DB2 record performance data for subsystem events.

2. If, during installation, you requested that DB2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

## What to do next

During DB2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other DB2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:

```
SYS(TYPE(100:102))
```

For DB2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if DB2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for DB2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks:

[☞ Controlling traces \(DB2 Administration Guide\)](#)

### Related reference:

[☞ -START TRACE \(DB2\) \(DB2 Commands\)](#)

[☞ z/OS MVS Initialization and Tuning Guide](#)

### Related information:

[☞ z/OS MVS Initialization and Tuning Reference](#)

## Connecting DB2 to TSO

If you are enabling data sharing, connect DB2 to TSO after you define the initialization parameters. This step is necessary only if you specified a group attachment name.

### About this task

Access to TSO is required to support the interactive component of DB2 (DB2I). Access to TSO also allows batch applications to access DB2 when those batch programs are executed under the TSO terminal monitor program (TMP).

### Procedure

To attach DB2 to TSO:

1. Make DB2 load modules available to TSO and batch users.
2. Make DB2 CLISTs available to TSO and batch users.

3. Make PL/I options available (if applicable).
4. Make panels, messages, and load modules available to ISPF and TSO.
5. Connect the DB2I panels to the ISPF Main Panel.

**Related tasks:**

Make DB2 load modules available to TSO and batch users

Make DB2 CLISTs available to TSO and batch users (DSNTIJVC)

Ensure that PL/I options are available

Make DB2I panels, messages, and load modules available to ISPF and TSO

Connect DB2I panels to the ISPF main panel

## Defining DB2 to z/OS for enabling data sharing

After you run job DSNTIJMV, you might need to define DB2 in SYS1.PARMLIB. This step is only necessary if you are changing the command prefix, or adding or changing the group attachment name.

### Before you begin

Run job DSNTIJMV, as described in Identifying DB2 to z/OS: DSNTIJMV.

### About this task

Job DSNTIJMV creates new subsystem definitions in the IEFSSNxx member.

### Procedure

To define DB2 to z/OS:

Do an initial program load (IPL) of z/OS. You must do this action to apply any DB2 or IRLM subsystem parameter changes in the IEFSSNxx member. After the IPL for z/OS completes, message DSN3100I is displayed on the z/OS console, stating that DB2 is ready for the START command.


### What to do next

Start DB2, as described in Starting the DB2 subsystem.

**Related reference:**

 -START DB2 (DB2) (DB2 Commands)

**Related information:**

 DSN3100I (DB2 Messages)

## Starting the DB2 subsystem

During the process of enabling data sharing, start the DB2 subsystem after you define DB2 to z/OS.

### Procedure

To start DB2:

1. Start the IRLM, if you have not requested that DB2 automatically start the IRLM. You must start IRLM before you start DB2.

Use the following command:

```
START irlmproc
```



where *irlmproc* is the name that you specified for the PROC NAME option on IRLM Panel 1 (DSNTIPI).

If you specified YES for the AUTO START option on IRLM Panel 1 (DSNTIPI), DB2 starts the IRLM automatically.

2. Start DB2 from the z/OS console. The simplest form of the following command is:

```
-DSN1 START DB2
```

where *-DSN1* is the subsystem command prefix that you defined for DB2.

When you issue the START DB2 command with this command format, DB2 uses the subsystem parameter module that is specified in the *ssnmMSTR* start-up JCL procedure in SYS1.PROCLIB.

If you need to change the name of the subsystem parameter module, you can edit the *ssnmMSTR* JCL member in SYS1.PROCLIB. Alternatively, you can override the default subsystem parameter module name by using the PARM option, as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, possibly *ssnmDIST*, possibly *ssnmADMT*, and *irlmproc*, where *ssnm* is the DB2 subsystem name, *ssnmADMT* is the DB2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

When you start DB2 10 for the first time, DB2 issues message DSNT501I with reason code 00C900A6. This message is expected. When you run job DSNTIJTC, which is required to complete the tailoring of the DB2 catalog, the cause of this message is corrected. Job DSNTIJTC is described in a later installation step.

After you start DB2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If DB2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIE, DSNTIJIF, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started DB2 is the one that is built by job DSNTIJUZ. Check the JCL for the DB2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

3. Optional: Start TSO. After DB2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

## Creating the default storage group and defining temporary work files: DSNTIJTM

After you start DB2 as part of the process for enabling data sharing, you must create the default storage group for user-defined DB2 tables that are not specifically assigned to a storage group. You must also define the database for temporary work files.

### Procedure

To create the default storage group and define temporary work files:

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

Table 93. DSNTIJTM return codes

Step	PROCSTEP	Return code
DSNTIAS	IKJEFT01	0000
DSNTICR	IKJEFT01	0000
DSNTIST	IKJEFT01	0000

### Results

The SYSDEFLT storage group is the default storage group, and it is used for your database, table space, and table definitions that are not related to a specific storage group. By default, it is also used for the work file database and for work file table spaces that are created during DB2 installation and migration. When DSNTIJTM creates the SYSDEFLT storage group, it completes the following grants:

- Grants use of the default buffer pool and storage group to PUBLIC.
- Grants use of the SYSDEFLT table space. This table space does not really exist, but this GRANT statement is necessary to give users the ability to implicitly create table spaces in the default database.
- Grants authority to create tables and table spaces in the default database to PUBLIC.

### What to do next

For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve DB2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table

spaces after you run job DSNTIJTM, use the DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

## Creating an image copy of the DB2 directory and catalog: DSNTIJIC (optional)

If you decide to image copy the DB2 directory and catalog, use the DSNTIJIC job that was generated during the installation or migration of the originating member. You do not need to make an image copy of the DB2 catalog or user data sets for recovery because DB2 uses image copies that were made before you enabled data sharing.

### Procedure

To create an image copy of the directory and catalog:

1. Examine job DSNTIJIC for the following information:

- The tape unit name. The job lists the tape unit name as TAPE. If this is incorrect for your site, correct it. The name TAPE is also the unit name for the default archive log data sets.
- Expiration date or retention period. You can add a retention period or an expiration date to the job.
- The user on the JOB statement. Ensure that the user is authorized. If DB2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.

2. Run job DSNTIJIC.

The DSNTIJIC job contains a list of all the DB2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the DB2 image copy utility to copy these table spaces to tape. Having copies of table spaces enables you to recover the DB2 catalog and DB2 directory in case of a failure.

3. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape setup for image copy. If you find no problems with the tape setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

### What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

During the ISPF tailoring session, you named one or two IDs to have installation SYSADM authority. One of these users can now grant various levels of authority to other users. You can use SPUFI or a job similar to DSNTIJSG to perform the authorization. To grant SYSOPR authority to all primary and secondary user IDs that issue DB2 commands from the z/OS console or TSO SDSF, issue the following statement in SPUFI:

```
GRANT SYSOPR TO userid
```

## Verifying that enabling data sharing was successful (optional)

If you ran the complete set of installation verification procedure (IVP) sample jobs after you migrated to DB2 10, you should not need to run these jobs again.

### About this task

When you start the originating member, DB2 checks your coupling facility, group, and member definitions and verifies that data sharing is enabled. You can also verify that the group has been correctly established by issuing the DB2 command `DISPLAY GROUP` after the originating member has completed startup.

### Procedure

To verify that enabling data sharing was successful:

Run the verification jobs that are described in Chapter 8, “Verifying that installation or migration was successful with the sample applications,” on page 783.

---

## Adding a new data sharing member

After you install a new data sharing group or enable an existing DB2 subsystem for data sharing, you can add new data sharing members. Always add a member as a new installation. After being added to the group, the new member uses the DB2 catalog of the originating member.

### About this task

When adding a new member to a group, you might need to make changes during installation to allow more XCF groups, or more XCF members per group. Or, you might need to “widen” the locks in the IRLM lock structure (for example, if the structure was initially allocated with a maximum of seven members, and the eighth member is joining the group).

DB2 does not have an automatic way to “merge” catalogs and resolve naming conflicts. If you have applications that currently run on several existing DB2 subsystems, your migration plan might include procedures for moving the relevant data and applications from those DB2 subsystems onto one or more of the group members. Your migration plan should also include procedures for resolving any catalog naming conflicts that result.


#### Related concepts:

Merging existing DB2 data into the group

#### Related tasks:

Installing DB2

#### Related information:

 IEFSSNxx (subsystem definitions) - keyword parameter form (MVS Initialization and Tuning Reference)

## Running the CLIST for adding a new member

The process of adding a new data sharing member involves running some of the installation jobs. Before you run the installation jobs, tailor them to your environment by running the installation CLIST.

## About this task

Jobs that the add-member CLIST tailors:

DSNTIJIN	DSNTIJMV	DSNTIJID	DSNTIJDE
DSNTIJTM	DSNTIJUZ	DSNTIJFT	DSNTIJGF

## Procedure

To tailor the installation jobs for adding a new member:

1. Invoke the installation CLIST.
2. On installation panel DSNTIPA1, specify:

```
INSTALL TYPE ==> INSTALL
DATA SHARING ==> YES
.
.
INPUT MEMBER NAME ==> originating member's output PDS member
OUTPUT MEMBER NAME ==> new member's output PDS member
```
3. On installation panel DSNTIP0A, specify option 2 for adding a member.
4. On installation panel DSNTIPK, specify a new member name:

```
MEMBER NAME ==> new member name
```

Verify that the *new member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnm*MSTR startup procedure with the member name that you specify on panel DSNTIPK.
5. Complete the installation panels, specifying parameters according to the DB2 subsystem parameters guidelines.

**Recommendation:** Rename the tailored SDSNSAMP data set for each member. This data set contains tailored JCL for each member, including jobs that are used for disabling and re-enabling data sharing, if that should ever become necessary. If you do not rename the SDSNSAMP data set, it is overwritten when you install a new member. Rename the data set by choosing a new name for the *prefix*.NEW.SDSNSAMP data set on installation panel DSNTIPT. For example, use *prefix.member\_name*.SDSNSAMP.

### Related concepts:

Subsystem parameters and application defaults in a data sharing environment

### Related tasks:

Invoking the CLIST

## Identifying DB2 to z/OS: DSNTIJMV

Job DSNTIJMV completes some of the steps that are required to identify DB2 to z/OS. These steps include updating members of SYS1.PARMLIB and SYS1.PROCLIB and creating Language Environment options data sets for the DB2 core WLM environment for Java routines.

## About this task

Do not overwrite the entries for DB2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of

| the PPT entries, see Program properties table (PPT) (MVS Initialization and Tuning  
| Reference).

## Procedure

To define DB2 to z/OS:

1. Run job DSNTIJMV. If job DSNTIJMV runs successfully, it produces return codes of 0.
2. Review the content of the Language Environment options data set and adjust the following environment variables as needed. The data set is created by DSNTIJMV and must be allocated by the JAVAENV DD of the address space procedure for the DB2 core WLM environment for Java routines.
  - `_CEE_ENVFILE`, if present, needs to be set to the name and path of the environment variable file that was created by job step DSNTIJR.
  - `JVMPROPS` needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
  - `DB2_BASE` and `JCC_HOME` need to be set to the names of the HFS directories that you selected for the DB2 for z/OS and JCC product classes.

## What to do next

z/OS requirements: Each DB2 and each IRLM that you define to z/OS in the IEFSSNxx PARMLIB member requires a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your DB2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs; otherwise, your subsystems might not start. If you need more than 165 LXs, use the NSYSLX option on the z/OS IEASYSxx PARMLIB member to increase this number.

For later diagnosis of IRLM problems, also ensure that the following requirements are met:


- Specify the IRLM dump formatting modules DXRRLM50, DXRRLM55, and DXRRLS55 in a BLSCUSER member in a data set that is in the system's PARMLIB concatenation.
- Copy the DXRRL186, DXRRLFTB, DXRRLM50, DXRRLM55, and DXRRLS55 modules from the IRLM SDXRRESL data set to a data set in the system's link list. Or, add the SDXRRESL data set to the system's link list in a PROGxx member of a data set in the system's PARMLIB concatenation. If you use more than one level of IRLM, you will need to use a STEPLIB concatenation when using IPCS to process dumps that are taken for the levels whose modules are not in the link list.

Additional changes to SYS1.PARMLIB and SYS1.PROCLIB: Because different sites have different requirements for identifying DB2 to z/OS, job DSNTIJMV cannot anticipate all the necessary updates. For this reason, the updates that job DSNTIJMV makes to SYS1.PARMLIB and SYS1.PROCLIB might be incomplete. You might have additional procedures of your own to rename. You can complete these updates either by making the updates directly in SYS1.PARMLIB and SYS1.PROCLIB, or by editing DSNTIJMV.

**Recommendation:** Edit the updates directly in SYS1.PARMLIB instead of submitting the updates in the DSNTIJMV step. For SYS1.PROCLIB, submit the procedure-update section of job DSNTIJMV. Before you make the updates, read the

following information and examine job DSNTIJMV to study the updates that it makes. Then use an editor such as ISPF/PDF to make the updates to SYS1.PARMLIB.

**Related concepts:**

 Runtime environment for Java routines (DB2 Application Programming for Java)

## Defining system data sets: DSNTIJIN

When job DSNTIJIN is tailored for adding a new member, it defines the new BSDS and active log data sets for that member to use SHAREOPTIONS (2 3). It does not define catalog and directory data sets.

### Procedure

To define system data sets:

1. Check the DEFINE CLUSTER statements in job DSNTIJIN to ensure that they allocate adequate disk space for your system.


**Recommendation:** For recovery purposes, place system data sets such as the DB2 recovery log and the VSAM catalog on different disk volumes. Because these data sets are used frequently, do not migrate them by using DFSMSHsm.

2. Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0 for all DEFINE statements and steps. Check any VSAM messages carefully.

3. If job DSNTIJIN fails or abends, run the DSNTIJDE job for the member to delete its BSDS and active log data sets. Then rerun the DSNTIJIN job for the member to re-create those data sets.

**Related concepts:**

 Allocating and extending data sets (DB2 Performance)

## Defining DB2 initialization parameters: DSNTIJUZ

Job DSNTIJUZ generates the subsystem parameter (DSNZPxxx) module. The subsystem parameter module is the name that was specified for the PARAMETER MODULE field on installation panel DSNTIPO3.

### Procedure

To define DB2 initialization parameters:

1. Verify that data sets that are allocated by the SYSLMOD DD statements of this job are also allocated by the STEPLIB DD statements of the DSNMSTR address space for DB2.
2. If the DB2 distribution library prefix is different from the target library prefix, edit DSNTIJUZ to correct the data set name for *prefix*.ADSNLOAD.
3. If you have not run the SMP/E ACCEPT job (DSNACEP1) of FMID HDBAA10, edit DSNTIJUZ to include the SMP/E temporary data set (SMPTLIB) in the concatenation for the ADSNLOAD DD statement in step DSNTIZQ. SMPTLIB is *hlq*.HDBAA10.F2, where *hlq* is from the GLOBAL SMP/E zone. Use the following SMP/E statements to get DSPREFIX:

```
SET BOUNDARY (GLOBAL).  
LIST DDDEF ( SMPTLIB ).
```

4. Insert the DSPREFIX value after SDSNLOAD and ADSNLOAD.

5. Run job DSNTIJUZ.

If you want DSNTIJUZ to establish SMP/E GENASM entries in the DB2 system parameter (DSN6xxxx) and application defaults module macros, you need to uncomment job step DSNTIMQ. Advanced SMP/E skills are recommended for users of job step DSNTIMQ. Read the job step prolog before proceeding. You might receive message GIM65001 when you run steps DSNTLOG and DSNTIMQ, or you might receive a return code of 4 when you run step DSNTIMQ. You can ignore these messages.

6. If job DSNTIJUZ fails or abends, correct the problem and rerun the job.

**Related reference:**

PARAMETER MODULE field

APPL DEFAULTS field

## Initializing system data sets: DSNTIJID

If you are adding a new data sharing member, you must initialize its BSDS and active log data sets after you define them and the member's DB2 initialization parameters.

### Procedure

To initialize system data sets:

Run job DSNTIJID.

- If the job runs successfully, it produces a return code of 0. Otherwise, check for and resolve error conditions that might be reported by VSAM messages.
- If the job fails or abends, rerun jobs DSNTIJDE, DSNTIJIN, DSNTIJUZ, and DSNTIJID for that member.

### Results

Job DSNTIJID records the active log data set names to the BSDS, formats the active log data sets, and initializes the DB2 directory table spaces and indexes.

## Defining user authorization exit routines: DSNTIJEX (optional)

When you add a new data sharing member, you should not have to make changes to the DB2 exit routines. However, if the new member is using its own separate load module or exit library, you must define the exit routines in the new library.


### Procedure

To define user authorization exit routines:

1. Modify job DSNTIJEX to reference the correct library.
2. Run job DSNTIJEX.

If job DSNTIJEX runs successfully, it produces return codes of 4.

**Related concepts:**

 [Connection routines and sign-on routines \(Managing Security\)](#)

## Recording DB2 data to SMF (optional)

When you add a DB2 data sharing member, you can specify whether DB2 statistical, accounting, and audit trace data is to be collected.



## Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
To have DB2 collect statistical information	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
To have DB2 collect accounting information	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
To have DB2 collect auditing information	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, DB2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

DB2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. DB2 can also record other performance data. After you complete the installation process, you can use commands to have DB2 record performance data for subsystem events.

2. If, during installation, you requested that DB2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

## What to do next

During DB2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other DB2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:


```
SYS(TYPE(100:102))
```

For DB2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if DB2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for DB2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks:

 [Controlling traces \(DB2 Administration Guide\)](#)

**Related reference:**

- [➞ -START TRACE \(DB2\) \(DB2 Commands\)](#)
- [➞ z/OS MVS Initialization and Tuning Guide](#)

**Related information:**

- [➞ z/OS MVS Initialization and Tuning Reference](#)

## Establishing subsystem security: DSNTIJRA (optional)

DB2 can control access to data within a DB2 subsystem. DB2 also works with outside security systems, such as RACF, that control access to the DB2 subsystem.

### About this task

Most of the tasks to establish subsystem security for a data sharing group need to be completed only after the originating member is installed. For other members, you must set up only the security of the administrative task scheduler of those members.

### Procedure

To set up subsystem security for data sharing members:

Customize and run job DSNTIJRA to complete the following tasks for each member of the group:

- Define the administrative task scheduler started task module to RACF program control
- Define the administrative task scheduler as a trusted context in RACF

**Related concepts:**

- [➞ Getting started with DB2 security \(Managing Security\)](#)

## Connecting DB2 to IMS (optional)

Connecting DB2 to IMS is an optional part of adding a new data sharing member. Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. Make DB2 load modules available to IMS.
2. Define DB2 to IMS.
3. Define new programs and transactions to IMS.
4. Prepare IMS applications for DB2.
5. Depending on your site, you might also need to:
  - Define DB2 plans for IMS applications.
  - Generate a user language interface.

**Related tasks:**

Connecting the IMS attachment facility

## Connecting CICS to DB2 (optional)

When you add a new member, you have the option of connecting CICS to the member.

### About this task

To connect DB2 to CICS, you must regenerate several CICS tables with additional entries. Coordinate this connection with your CICS support group.

#### Related tasks:

 Defining the CICS DB2 connection

## Defining DB2 to z/OS for adding data sharing members

After you run job DSNTIJMV, you must define DB2 in SYS1.PARMLIB.

### Before you begin

Enable data sharing on the originating member, as described in Enabling DB2 data sharing.

### About this task

Job DSNTIJMV makes the following changes to the SYS1.PARMLIB library:

- Creates new subsystem definitions in the IEFSSNxx member
- Creates new APF libraries in the IEAAPFxx member
- Creates new load module libraries in the LNKLSTxx member

The load module library SDSNLINK contains the early code. SDSNLINK contains modules that must be placed in the link list look-aside address space (LLA) because they are loaded at subsystem initialization during the IPL.

### Procedure

To define DB2 to z/OS:

Complete one of the following actions:

- IPL z/OS.

During the z/OS IPL, message DSN3100I appears on the z/OS console, stating that DB2 is ready for the START DB2 command.

- Use the z/OS command SETSSI to dynamically add the new DB2 and IRLM subsystems. For example, the following two commands can be used to add subsystems for DB2 and IRLM to MVS3:

```
RO MVS3,SETSSI ADD,SUB=DB3A,INITRTN=DSN3INI,INITPARM='DSN3EPX,-DB3A,S,DB0A'  
RO MVS3,SETSSI ADD,SUB=DJ3A
```

**Recommendation:** Add z/OS to the IEFSSNxx member so that it can be used on a subsequent IPL.

**Restriction:** The SETSSI command can be used only to add a new subsystem to the IEFSSNxx member. Changing parameters such as the subgroup for an existing entry requires an IPL.

#### Related tasks:

Strategy for creating a DB2 data sharing group

**Related reference:**

➔ z/OS SETSSI Command (MVS System Commands)

**Related information:**

➔ DSN3100I (DB2 Messages)

## Starting the DB2 subsystem

During the process of adding a data sharing member, start the DB2 subsystem after you define DB2 to z/OS.

### Procedure

To start the DB2 member:

1. Start the IRLM, if you have not requested that DB2 automatically start the IRLM. You must start IRLM before you start DB2.

Use the following command:

```
START irlmproc
```

where *irlmproc* is the name that you specified for the PROC NAME option on IRLM Panel 1 (DSNTIPI).

If you specified YES for the AUTO START option on IRLM Panel 1 (DSNTIPI), DB2 starts the IRLM automatically.

2. Start DB2 from the z/OS console. Use the following command:

```
-DSN1 START DB2
```

where (-DSN1) is the subsystem command prefix that you defined for DB2.

DB2 uses the subsystem parameter module that is specified in the start-up JCL procedure in SYS1.PROCLIB:

```
//IEFPROC EXEC PGM=DSNYASCP,PARM='ZPARAM(DSNZPxxx)', ...
```

where *DSNZPxxx* is the value that you specified for the PARAMETER MODULE field on installation panel DSNTIPO3.

If you need to change the name of the *DSNZPxxx* module, you can edit SYS1.PROCLIB. Alternatively, you can override the *DSNZPxxx* name by using the PARM option as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run yet job DSNTIJRT on any member of the group, and the administrative task scheduler for this member starts, the administrative task scheduler issues error message DSN A679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, possibly *ssnmDIST*, possibly *ssnmADMT*, and *irlmproc*, where *ssnm* is the DB2 subsystem name, *ssnmADMT* is the DB2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I RESTART COMPLETED  
DSN9022I DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

After you start DB2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If DB2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started DB2 is the one that is built by job DSNTIJUZ. Check the JCL for the DB2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

3. Optional: Start TSO. After DB2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

## Results

Transactions that run on a new member might initially fail because work files are not defined until you run that member's job DSNTIJTM.

## Creating the default storage group, defining temporary work files, and binding DB2 REXX Language Support: DSNTIJTM

After you start DB2 when you add a data sharing member, you must activate its buffer pools and create its work file database.

## Procedure

To define the new member's buffer pools and create its work file database:

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

Table 94. DSNTIJTM return codes

Step	PROCSTEP	Return code
DSNTIAB	(none)	0000
DSNTIAS	(none)	0000
DSNTICR	(none)	0000
DSNTIST	(none)	0000

## Results

DSNTIJTM defines the new member's initial buffer pools according to the sizes that are specified on installation panels DSNTIP1 and DSNTIP2. It also creates the work file database for the new member according to the values that you specified on panel DSNTIP9.

DSNTIJTM also provides some cleanup to ease reruns.

## What to do next

For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve DB2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table spaces after you run job DSNTIJTM, use the DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

### Related concepts:

Work file database storage requirements

## Creating an image copy of the DB2 directory and catalog: DSNTIJIC

After you add a data sharing member, you need to create a backup copy of the DB2 directory and catalog. Use the DSNTIJIC job that was generated during the installation or migration of the originating member to create the image copy.

### Procedure

To create an image copy of the directory and catalog:

1. Run job DSNTIJIC.


The DSNTIJIC job contains a list of all the DB2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the DB2 image copy utility to copy these table spaces to tape. Having copies of table spaces enables you to recover the DB2 catalog and DB2 directory in case of a failure.

2. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape setup for image copy. If you find no problems with the tape setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

## What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

### Related concepts:

 Privileges and authorities (Managing Security)

## Verifying that adding a data sharing member was successful

When you complete the procedure to add a new data sharing member, you should verify that the member was added successfully.

### Procedure

To verify that adding a data sharing member was successful:

Run the verification jobs that are described in Chapter 8, “Verifying that installation or migration was successful with the sample applications,” on page 783.

### What to do next

After you successfully add all the data sharing members for the group, you should Test the data sharing group.

## Ensuring that the WLM address space is defined and available

After you verify that the data sharing member was added successfully, you must ensure that the WLM address space for the member is defined and available.

### About this task

When the WLM address space is defined correctly and available, the WLM address spaces can start without errors when connections land on any member of the group.

### Procedure

To verify that the WLM address space is defined and available:

Update the JCL startup procedure for the WLM application environment by using one of the following methods:

- Add the WLM application environments that are specific for each member of the group.
- Modify existing definitions to work for any member of the group.

### Related concepts:

Special considerations for WLM-managed stored procedures in coexistence

---

## Merging existing DB2 data into the group

Although DB2 cannot automatically merge catalogs, you can merge existing DB2 subsystems into a data sharing group. Consider carefully a decision to merge existing DB2 subsystems.

Merging is a very complicated process. It involves not only the physical issue of moving data, but also many other management issues, including:

- Naming conventions for users, plans, packages, databases, tables, views, and more
- Authorization techniques
- Backup and recovery conventions
- Availability practices

Before you consider merging existing DB2 subsystems into a single data sharing group, ask yourself the following question: Why are the DB2 subsystems separate now?

## Merging subsystems

You can merge existing DB2 subsystems into a single DB2 data sharing group.

### Procedure

To merge existing subsystems into a single DB2 data sharing group, complete the following steps:

1. Choose one of the subsystems to be the originating member.
2. Move data and data definitions from the other DB2 subsystems to the subsystem that you designated as the originating member. For more information, see *Moving data that you are merging*.

**Tip:** Use a location alias, remote applications do not have to change aliases during the merging processes. Remote applications use a location name to access the DB2 subsystem. You can define the previous location names of each subsystem as location alias names for the group. After the subsystems are merged, remote applications continue to connect, without changes to the location names in the applications. For more information, see *Specifying a location alias name for multiple sites (DB2 Application programming and SQL)*.

3. Enable data sharing on the originating member, as described in *Enabling DB2 data sharing*.
4. Add the other DB2 subsystems as members of the data sharing group, as described in *Adding a new data sharing member*.

## Merging data

If you have an application that is currently running on independent DB2 subsystems, you might decide that the application will work well in a data sharing group.

In that case, you must move the data and merge the catalog definitions for that data from the independent DB2 subsystems into the data sharing group. Because the DB2 subsystems still exist, you cannot reuse their subsystem names when installing the subsystems as new members into the data sharing group.

DB2 does not provide an automated way to move catalog definitions from an independent DB2 subsystem into the catalog of the data sharing group. If you have procedures and tools to move applications from test to production, or to handle merging databases from enterprise reorganizations or mergers, those same procedures can be used to move applications into the data sharing group.

### Existing distributed applications

If you move existing data to the data sharing group, it is likely that the location name of objects will change.

Existing distributed applications that remotely reference an object by its three-part name must be changed to reference the new name. Aliases that exist on that table must also be dropped and re-created with the new location name.



Applications that contain explicit SQL CONNECT statements that reference an old location name must be modified. Any DB2 plan that uses an old location name for the CURRENTSERVER keyword must be bound again.

## Moving data that you are merging

In the context of DB2 data sharing, a *target* refers to the DB2 subsystem to which you are moving data (the data sharing group). A *source* refers to the DB2 subsystem from which you are moving data.

### Procedure

To move data that you are merging:

1. Decide the method that you will use to move data. Three options are outlined below; you can use a combination of the specified methods. Each of the methods assumes that the objects that are to be created in the target system are created with the exact DDL that is used in the source system. Descriptions of methods 1, 2, and 3 are referred to throughout the procedure, and are described in detail below.
  - **Method 1: Unload and Reload:** The data that is to be moved is unloaded from the source DB2 subsystem and loaded into the target data sharing group by using the DB2 online utilities, UNLOAD and LOAD. This approach is the most simple because tables are created without concern for object IDs, and data is unloaded or reloaded using conventional techniques. The major disadvantage of this method is that it is the slowest of the three methods, in terms of performance. The unload and reload methods operate against rows of a table, whereas the other techniques operate against pages or data sets as their level of granularity. Additionally, this method requires two to three times the disk space that the other methods require, depending on how you unload or reload (source, target and intermediate unload).
  - **Method 2: DSN1COPY with OBID translation:** The data that is to be moved is copied from the source system to the target system using the DB2 offline utility DSN1COPY. DSN1COPY is usually faster than unload and reload because it moves pages of data, rather than rows. This method is more complicated because the object IDs in the source data will need to be translated.
  - **Method 3: Use DB2 VSAM data sets from the source system in the target system:** The VSAM data sets that are used to hold the table space and index space data from the source system are used in the target system, without copying any data. Because this method does not require copying the data, it is the fastest of the three methods, in terms of performance. It is, however, the most complicated. Another advantage of this method is that it requires less disk space than the other methods; this method is generally used for very large table or index spaces. Method 3 assumes that all of the disk volumes in the source system used by objects being moved by this method are shared and accessible with the target system.
2. Choose a catalog that belongs to one of the DB2 subsystems to be the “original” catalog for the data sharing group. This DB2 subsystem is considered the originating member of the group.

You should consider many different factors when choosing which DB2 subsystem to be the originating member of the group. For example, it makes sense to choose the member with the most database objects as the originating member in order to minimize the number of objects that you move.

However, if all DB2 subsystems are mostly equivalent, and you are not planning to use DSN1COPY, consider the log RBA values of the existing

subsystems. Compare the end-of-log RBAs with the high-order 6-bytes of the time-of-day clock timestamp on each of their systems (this is called the *truncated timestamp*). The usual case is that the RBA is less than the truncated timestamp. In this case, any DB2 subsystem is chosen as the originating member.

In the event that the current end-of-log RBA in any of the existing DB2 subsystems is higher than the 6-byte truncated timestamp value at the time you are ready to enable sharing, you have the following choices:

- Choose the DB2 subsystem that has the highest RBA as the originating member.
  - Use DSN1COPY with the RESET option to reset the log RBAs in each data and index page to 0 when you move databases from other DB2 subsystems to the data sharing group.
3. Resolve name conflicts among the objects and authorization IDs in the data sharing group.
  4. Create the objects on the target subsystem.

When creating objects while you are using methods 1 or 2 to move the data, the CREATE statements can be entered in any order. DB2 assigns new OBIDs for these objects.

If you are using method 3, you must perform the following steps:

- a. Consider creating the data sets with the minimum size settings to save space. The actual target system VSAM data sets created by the DDL execution are not used because the VSAM data sets that are from the source system are used instead. By choosing to create the objects with minimum sizes, you eventually need to issue ALTER TABLESPACE and ALTER INDEX statements to change the PRIQTY and SECQTY after the CREATE. If, however, you are using the same high-level qualifier for the source and target systems (which is not recommended), you must create the objects with DEFINE NO, and take additional steps later. DEFINE NO is needed when keeping the same high-level qualifier, because the VSAM data set name would be identical in the source and target systems. In this case, DB2 would not be able to define the data set on the target system during the create processing because the data set already exists.
- b. Query the SYSIBM.SYSTABLES table in the DB2 catalog on the source subsystem to get the table OBID for tables that are within the databases that are being moved. Additionally for both the source and target systems, the DBID and PSID are needed for table spaces (from SYSIBM.SYSTABLESPACE) and the DBID and ISOBID are needed for indexes (from SYSIBM.SYSINDEXES). These will be used to build REPAIR jobs to modify these IDs in the header page, and potentially the first space map page in a later step.
- c. Use the OBID clause on the CREATE TABLE statement on the target subsystem to specify an OBID that is the same as the table OBID on the source subsystem. Verify that the OBID that you specify is available. If an OBID is being used for another object within the same database, such as an index or referential constraint, DB2 does not allow you to create the table with the specified OBID.

**Recommendation:** To help guarantee the availability of OBIDs for all tables within a database, defer the creation of all indexes and referential constraints until all tables are created. All CREATE TABLE statements must have the OBID clause to guarantee that they are assigned the correct OBID. If an explicit table space name is specified, then the CREATE TABLESPACE

statement must come immediately before the first CREATE TABLE statement for that table space. This helps prevent a group of CREATE TABLESPACE statements from using up OBIDs that are needed for the tables.

For methods two or three, the objects in the target system will be created with several assumptions that might require the additional steps that are outlined below:

- The VSAM data sets for each new object are created using the 'T' prefix for each of the data sets. It is possible that on the source system online REORG has executed, causing the data sets to have a 'J' prefix. If this is the case, you will need to code the DSN1COPY for method two, to have the correct 'J' data set designation or rename the data set back to the 'T' prefix for method three in a later step. You should query the source catalog for column IPREFIX in SYSIBM.SYSTABLEPART for table spaces, and SYSIBM.SYSINDEXPART for indexes, to find any 'J' prefix objects.
  - If any of the index names involved in the move are greater than eight characters in length, DB2 generates a unique INDEXSPACE name to be used in naming the VSAM data set. The INDEXSPACE name generated will most likely be different in the source and target systems. You should query the source and target catalogs to get a list of the INDEXSPACE names for the indexes that have a name greater than eight characters (found in SYSIBM.SYSINDEXES). These will be used in a later step.
5. On the source DB2 subsystem, run the REORG utility on any table spaces for which a table alteration has occurred with no subsequent REORG.
- If you are unsure if a table meets this criteria, query SYSIBM.SYSTABLES for those tables in which CREATEDTS does not equal ALTEREDTS. However, there is no way to tell from the DB2 catalog what kind of ALTER was performed and whether it would have affected this process. By comparing the CREATEDTS and ALTEREDTS, you will at least gather a list of candidates. If all rows have CREATEDTS equal to ALTEREDTS, running the REORG utility is unnecessary.
6. Move the data choosing one of the three methods that match the ones listed above:
- **Method 1: Unload / Reload:**
    - a. Start the objects on the source system in RO mode.
    - b. Execute the UNLOAD utility on the source system to unload the data to a sequential file.
    - c. Execute the LOAD utility on the target system to load the data that was unloaded when performing the step listed above.
  - **Method 2: DSN1COPY with OBID translation :**
    - a. Stop the object, for both table space and index, on the source and target systems.
    - b. Execute DSN1COPY with OBID translation and the RESET option to copy the data from the source system to the target system. If the online REORG utility has been run, be sure to code the proper I/J data set names in the DSN1COPY job. Also, if any indexes were created with names greater than eight characters long you will need to incorporate the INDEXSPACE name differences retrieved in an earlier step.
    - c. Start the objects on the target systems R/W.
  - **Method 3: Use DB2 VSAM data sets from source system in the target system:**
    - a. Stop the table spaces and index spaces in the target system.

- b. If the high level qualifier (HLQ) is not changing between the source and target systems, which is not recommended, then perform the following steps on the target system. Note that this process assumes that the objects were created in the target system with DEFINE NO utility.
  - 1) Change SPRMCTU in the DSN6SPRM macro to one. This enables the catalog to be updated. Also, change DLDFREQ to zero, which disables the down level detection. You must note the original value, because you will change DLDFREQ back to the original value in a later step. Assemble the changed zparm and restart the target system to pick up the change.
  - 2) Using SQL, update the SPACE column from SYSIBM.SYSTABLEPART and SYSIBM.SYSINDEXPART from -1 to 0 for the table and index spaces that you are moving using method three.
  - 3) Run the REPAIR DBD REBUILD utility for the databases created earlier. This step is needed because the above step changed the SPACE value in the DB2 catalog from -1 to 0, but the value is also in the DBD. This means that when the REPAIR DBD REBUILD utility is run, it will take the information from the catalog and rebuild the DBD in the directory, making DB2 think that the data set has already been defined.
 


**Note:** Do not try to access the tables at this point. Both systems will think that the data set is theirs, but only one system will actually be able to access the data set. The REPAIR DBD REBUILD utility only should be executed after all table spaces and index spaces that are being moved by method three for a particular database, have their catalogs updated via SQL.
  - 4) Change SPRMCTU back to zero, and then DLDFREQ to the previous value it was assigned. Next, reassemble the zparm and recycle the target system so it recognizes the change.
- c. Delete the target system VSAM data sets for the table spaces and indexes, unless they were created with DEFINE NO, because the HLQ did not change.
- d. Use the REPAIR utility on the source system to change the identifiers in the page set header page, or header pages, if you have a partitioned page set, to match the new identifiers on the target subsystem. The identifiers consist of two, 2-byte fields, HPGDBID and HPGPSID. You must locate and replace these identifiers with the new DBID and PSID of the target system as follows:
  - For non-partitioned page sets, locate and replace the 4-byte fields starting at X'0C', which begins on page zero.
  - For partitioned page sets, locate and replace the 4-byte fields starting at X'0C' on page zero for each partition.
- e. If the table space that you are working with is segmented and compressed, and a dictionary exists, you must also run the REPAIR utility on the source system to change the OBID in the first space map page.
- f. Stop the object, for table space and index, on the source system.
- g. If the HLQs of the source and target systems are different, you must run the IDCAMS ALTER statements. Running the IDCAMS ALTER statements changes the HLQ of the VSAM data sets from the source system to be the new HLQ of the target system. If the HLQ is changing,

then the VSAM data sets of the target system must be first deleted before running IDCAMS ALTER. Additionally, if you know from completing one of the previous steps that the online REORG utility has been executed on the source system, make sure that you change any 'J' data sets to match the target system. The target system should have all 'I' data sets, as they were newly created. Also, if any indexes were created with names greater than eight characters long, you will need to incorporate the INDEXSPACE name differences retrieved in an earlier step.

- h. Start the table spaces and index spaces in the target system.
  - i. Use the REPAIR utility with the LEVELID option to reset the level indicator of the page sets to a neutral value on the target system.
  - j. Stop the object, for table space and index, on the source system.
7. You now have the option to drop the database objects on the source subsystem. If you do not choose to drop the objects at this point, and used method three to move data while keeping the same HLQ for the data sets, then you should consider altering the VCAT name in the source system to a different invalid value. You should alter the VCAT name so that the source DB2 does not try to open the data set that is now in use by the target system.
  8. Take full image copies of all data. This is the earliest time at which data recovery can occur after the merge.
  9. Run the RUNSTATS utility on the target system.
  10. Bind all plans and packages on the target subsystem that were bound on the source subsystem. Bind any plans and packages on the target subsystem that have changed because of name conflict resolution. Grant the appropriate authorizations to all plans and packages.

**Related reference:**

 [DSN1COPY \(DB2 Utilities\)](#)

 [REPAIR \(DB2 Utilities\)](#)

**Running REPAIR to modify OBID for a compression dictionary:**

Additional invocations of the REPAIR utility might be necessary if you use DB2 VSAM data sets from the source system to move data that you are merging in the target system and the table space is segmented and compressed.

**About this task**

If the segmented, compressed table space has a dictionary, the space map page that contains the dictionary has an OBID that is the same as the table space that was modified in the header page when you moved and merged your data. The OBID in the space map must be modified to match the new value in the header page.

**Procedure**

To modify the OBID in the space map to match the new value in the header page:

1. Use the DSN1PRNT utility to view the data set header page and space map. The following is an example from DSN1PRNT with the FORMAT option. On the header page, or page zero, you will see something similar to the output displayed in the following figure:

```

PAGE: # 00000000 -----
HEADER PAGE: PGCOMB='10'X  PGLGRBA='BC8DB9277831'X  PGNUM='00000000'X  PGFLAGS='38'X
HPGOBID='018E0002'X  HPGHPREF='000000B4'X  HPGCATRL='00'X  HPGREL='D3'X  HPGZLD='D3'X

```

Figure 79. Sample header page of DSN1PRNT command with the FORMAT option.

The following figure shows the first space map page, or page 1:

```

FIRST PART OF SEGMENTED SPACE MAP:
SEG 0001  000000020002C0 FFFF
SEG 0002  00000003000280 FFFF
SEG 0003  00000004000280 FFFF
SEG 0004  00000000000280 FFFF
SEG 0005  000000060003C0 3333
SEG 0006  00000007000380 3333
SEG 0007  00000008000380 3333
SEG 0008  00000009000380 3333
SEG 0009  0000000A000380 3333
SEG 000A  0000000B000380 3333
SEG 000B  0000000C000380 3333
SEG 000C  0000000D000380 3333
SEG 000D  0000000E000380 3333
SEG 000E  00000000000380 3300

```

Figure 80. Sample output from first space map page of DSN1PRNT command with FORMAT option.

In the header page, HPGOBID is the DBID concatenated with the OBID. In the first figure above, HPGOBID is X'018E0002', so the DBID is X'018E' and the OBID is 0002'X. You can see that same OBID in the first four segments in the space map page, or bytes 5 and 6, following the segment number.

If you run DSN1PRNT on pages 0 and 1, and you do not see the same OBID in the space map page as the one listed on the header page, it means that the dictionary is not yet built. If the dictionary is not built, you only see the table segments (segments X'5' thru X'E' shown above). If this is the case, you do not need to modify the OBID and you can stop this task.

- Use the REPAIR utility to modify the OBIDs in the space map to match the new OBID in the header page. Only the segments that match the OBID in the old header page must be modified. The remaining segments are for the table and do not need to be modified.

In the second figure above, you can see that the first four segments need to be modified and that the table OBID is X'0003'.

The number of segments that need to be modified is dependent on the SEGSIZE value of the table space. The following table shows the offset of the OBIDs that need to be modified for each SEGSIZE.

Table 95. The offset of OBIDs that need to be modified in order of SEGSIZE

SEGSIZE	Offset of OBIDs to REPAIR
4	X'20'
	X'29'
	X'32'
	X'3B'
8	X'20'
	X'2B'

Table 95. The offset of OBIDs that need to be modified in order of SEGSIZE (continued)

SEGSIZE	Offset of OBIDs to REPAIR
12	X'20' X'2D'
16-64	X'20'

## Mixed releases in a DB2 data sharing group

A DB2 data sharing group can remain available while you migrate members of the group from DB2 9 to DB2 10 release.

However, planning the migration for periods of low activity in the group is recommended because, due to locks that are obtained by the catalog migration utility (CATMAINT), parts of the DB2 catalog are unavailable during the migration of the first member. The parts that are unavailable vary from release to release, depending on what catalog parts require modification.

The purpose of coexistence is to allow applications to continue to access DB2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence mode: new functions are not available, and there are some system management issues to consider.

If you do not require continuous availability, consider shutting down the group during the migration to avoid the coexistence environment. If must run in coexistence, plan to migrate the members in as short a time as possible so that you can minimize the operational complexity.

### Related tasks:

Preparing for DB2 10 migration in DB2 data sharing

### Related reference:

 [CATMAINT \(DB2 Utilities\)](#)

## Special considerations for WLM-managed stored procedures in coexistence

The WLM-managed stored procedure address space (WLM-SPAS) that processes a stored procedure or UDF program always connects to the DB2 member that processes the SQL call request. Therefore, the DB2 code that is executed in the WLM-SPAS must match the DB2 release of the DBM1 address space, or an error occurs.

When running in a data sharing group, each member has a different DBM1 address space. This means that the DB2 code in the WLM-SPAS will have to match more than one DB2 release level. This can cause a problem when you want to use a single JCL definition for the procedure name listed in the WLM definition.

To define one JCL procedure to reference DB2 code data sets at different release levels, use a simple data set and alias naming convention. If the procedure library is shared throughout the SYSPLEX, this allows for a single JCL definition for the Procedure Name that is listed in the WLM definition.

In the following example, the DB2SSN parameter is used as a part of the data set name in STEPLIB. This allows redirection to a data set name based on the SSN of the member that is invoking the stored procedure or UDF.

In the WLM definition:

```
Application Environment Name . . : DB2GROUP1
Description . . . . . GROUP 1 APPS
Subsystem Type . . . . . DB2
Procedure Name . . . . . DB2AWLM1
Start Parameters . . . . . DB2SSN=&IWMSSNM
```

---

Limit on starting server address spaces for a subsystem instance:

- 1 1. No limit
2. Single address space per system
3. Single address space per Sysplex

The special keyword &IWMSSNM in the WLM definition causes WLM to send the subsystem name as the DB2SSN parm when the address space is started. In the WLM-SPAS JCL:

```
//DB2AWLM1 PROC RGN=0M,DB2SSN=,NUMTCB=1,APPLENV=DB2GROUP1
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
// PARM='&DB2SSN,&NUMTCB,&APPLENV'
//STEPLIB DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNEXIT
// DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNLOAD
// DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNLOD2
// DD DISP=SHR,DSN=DSNT2.RUNLIB.LOAD
```

If one subsystem name is DT21 then the following alias can be used to redirect the library name to a release-specific library for that member. This would allow you to have a single release-specific library for a data sharing group.

```
DSNT2.DT21.SDSNLOAD *ALIAS
```

As members are migrated, the ALIAS can be changed to reflect the new release that the member is running.

## Determining the release of a data sharing group in coexistence

| When the first data sharing member starts DB2 10, the catalog is considered to be  
| at that level, even though not all members of the group have migrated. This means  
| that the *catalog level* for the group is DB2 10.

### Procedure



To determine the catalog level of a group:

Issue the DISPLAY GROUP command. The catalog level is shown near the top of the display.



## Determining the function level of an IRLM group in coexistence

IRLM communicates coexistence information by using function levels. A function level is an ever-increasing number that each IRLM can use to tell other IRLMs in the group what level of function it supports.

### About this task

The group function level is the **minimum** of the individual IRLM function levels for all IRLMs that can coexist. An IRLM that tries to join a data sharing group is prevented from doing so by active members that cannot coexist with the new IRLM's function level.

When the function level for the group changes, that change is serialized by IRLM with lock structure rebuilds. In most cases, however, the lock structure does not actually do a full rebuild. The first phase of the rebuild is enough to quiesce the work and cause the function level change to occur. These “partial” rebuilds take place when an IRLM joins the group and if that activity causes the group function level to change. For example, if the IRLM group is currently at function level *n*, and the IRLM member that wants to join the group is at *n-1*, the partial rebuild occurs to lower the group function level.

### Procedure

To determine IRLM function levels:

Enter the following command:

**GUIP**

```
MODIFY irlmproc,STATUS,ALLI
```

### Examples

**Example 1:** Assume a data sharing group exists with three members running DB2 DB2 10 conversion mode from Version 9 and one member running DB2 9. Issuing the `MODIFY irlmproc,STATUS,ALLI` command from one of the three DB2 10 members produces output that is similar to the following output:

```
DXR103I QR21002 STATUS 622
        IRLMS PARTICIPATING IN DATA SHARING GROUP FUNCTION LEVEL=2.029
        IRLM_NAME IRLMID STATUS LEVEL SERVICE MIN_LEVEL MIN_SERVICE
        PR21*   001   UP   3.029 PM28625   1.022   PM28625
        QR21    002   UP   2.029 PM28625   1.022   PM28625
        SRLM    004   UP   3.029 PM28625   1.022   PM28625
        TRLM    005   UP   3.029 PM28625   1.022   PM28625
DXR103I End of display
```

**GUIP**

The IRLMs in the preceding example are at group function level 2.029, which is the lowest level of any of the individual members (QR21). The `MIN_LEVEL` field shows the minimum level with which this IRLM can coexist. `MIN_SERVICE` indicates the service or release that corresponds with that `MIN_LEVEL`.

## GUIP

**Example 2:** Assume the same data sharing group as described in the previous example. Issuing the `MODIFY irlmproc, STATUS,ALLI` command from the DB2 9 member produces output that is similar to the following output:

```
DXR103I DJ3A003 STATUS
          IRLMS PARTICIPATING IN DATA SHARING GROUP FUNCTION LEVEL=022
          IRLM_NAME IRLMID STATUS LEVEL SERVICE MIN_LEVEL MIN_SERVICE
          DJ1A      001   UP      094 HIR2220      022      HIR2220
          DJ2A      002   UP      094 HIR2220      022      HIR2220
          DJ3A      003   UP      022 PQ52360    012      PN90337
DXR103I End of display
```

## GUIP

### Call attachment and TSO attachment in coexistence

While operating in a coexistence environment, you can attach to either DB2 release with your existing TSO logon procedures or with JCL.

After you migrate all members of the group to DB2 10, update those procedures and jobs to point to the DB2 10 load libraries.

### Automatic binds in coexistence

Changes to package structures that are introduced in DB2 10 are not available to members of the group that have not migrated. You must plan accordingly when developing your migration plan.

It is best to prevent packages that are bound or rebound on DB2 10 from running on members that have not yet been migrated, for the following reasons:

- To prevent the automatic rebinds that occur when plans or packages that are bound on Version 10 run on Version 8 or Version 9.
- To prevent automatic *remigration rebinds*, which might occur repeatedly when a Version 10-bound plan or package that was automatically rebound on Version 8 or Version 9 is later run again on Version 10.

The migration process binds new packages in DB2 10, including packages for DB2-supplied stored procedures, user defined functions, and tools such as SPUFI and the DB2 REXX language support. Data sharing members in the DB2 10 load and execute those programs from the DB2 10 SDSNLOAD library. Data sharing members on DB2 9 continue to load this packages from the SNDSNLOAD library for DB2 9.

If you must rebind some of your application packages in Version 10 while coexistence with DB2 Version 8 or DB2 9 continues, you must consider how to handle the resulting binds and automatic rebinds while the different releases coexist. In most cases, the recommended approach is to avoid repeated remigration rebinds by setting the value of the ABIND subsystem parameter to COEXIST.

#### Related concepts:

 [Automatic rebinds \(DB2 Application programming and SQL\)](#)

[Release coexistence in a data sharing environment](#)

#### Related reference:

AUTO BIND field (ABIND subsystem parameter)

## Disallowing all automatic rebinds

One approach to handle binds and automatic rebinds while two releases coexist is to disallow all binds and disable all automatic rebinds on DB2 10 members.

### Procedure

To disallow or avoid automatic rebinds on a DB2 10 member:

- Specify NO for the ABIND subsystem parameter. This disables all automatic rebinds on the DB2 10 member for any reason. The result is that you cannot run a plan or package on a DB2 10 member if it has gone through the following scenario:

1. Binds on a DB2 10 member.
2. Runs on a Version 8 or a DB2 9 member. This action causes an automatic rebind on the Version 8 or DB2 9 member.
3. Attempts to run on a DB2 10 member.

(This action returns a -908 SQLCODE (SQLSTATE '23510') because DB2 must automatically rebind the plan or package on DB2 10 before running it on the DB2 10 member.)

- 

#### GUI

Use the resource limit facility to disallow BIND operations. Do this by inserting rows in the resource limit specification table (RLST) to set RLFFUNC to “1” and RLFBIND to “N”. This ensures that nobody binds plans or packages on DB2 10.

For example, the following INSERT statement for the RLST table, disallows all BIND operations for all authorization IDs (except those with installation SYSADM or installation SYSOPR authority) for all packages and plans:

```
INSERT INTO authid.DSNRLSTxx
(RLFFUNC,RLFBIND) VALUES('1','N');
```

#### GUI

### What to do next

After all members of a data sharing group migrate to the current release, enable automatic rebinds by setting the ABIND subsystem parameter to YES. Allow bind operations by changing the RLST table accordingly or by stopping the resource limit facility by issuing a STOP RLIMIT command.

**Related tasks:**

 [Restricting bind operations \(DB2 Performance\)](#)

**Related reference:**

AUTO BIND field (ABIND subsystem parameter)

## Disallowing the automatic remigration rebind

One approach to handling binds and automatic rebinds while two releases are coexisting is to disable only automatic remigration rebinds. By disabling automatic remigration rebinds, you avoid the thrashing that can occur when a plan or package is rebound each time it runs on a member of a different version.

## Procedure

To avoid the automatic remigration rebind situation:

Specify COEXIST for the ABIND subsystem parameter on the DB2 10 members. Automatic rebind then occurs on DB2 10 in the following circumstances:

- The package is marked invalid.
- A plan or package that was previously bound on DB2 10 runs on Version 8 or DB2 9.

When all members are at DB2 10, packages that are remigrated from Version 8 or DB2 9 are not automatically rebound.

### Related concepts:

Automatic binds in coexistence

### Related reference:

AUTO BIND field (ABIND subsystem parameter)

## Recommendations for BIND in coexistence

If DSN is at DB2 10 and the member that is named in the DSN command is at Version 8 or DB2 9, using certain bind options causes a BIND or REBIND subcommand to be rejected.

If you are migrating from Version 8 or DB2 9, the following bind option causes rejection:

- ENCODING for BIND and REBIND PLAN or PACKAGE


To avoid problems, make sure that the member that is named in the DSN subcommand matches the load libraries that are used for the DSN command.


### Related concepts:

Automatic binds in coexistence

### Related reference:

 The DSN command and its subcommands (DB2 Commands)

 BIND PACKAGE (DSN) (DB2 Commands)

 REBIND PACKAGE (DSN) (DB2 Commands)

### Related information:

## Recommendations for utilities in coexistence

Until all members of the data sharing group are running DB2 10, avoid using any of the new utility functions that are available in DB2 10. However, as long as you use utility options that are supported in Version 8 or Version 9, utilities can attach to either a Version 8 or Version 9 member.

The utilities batch program (DSNUTILB) is split into multiple load modules: a release-independent load module called DSNUTILB, multiple release-dependent module DSNUT810 (or DSNUT910, if you are migrating from Version 9) or DSNUT101, and multiple utility-dependent load modules. To operate in a mixed-release data sharing environment, you must have DSNUT810 or DSNUT910 (if applicable), and DSNUT101. And you must have all utility-dependent load

modules and their aliases for the utilities that you have purchased available to the utility jobs that operate across the data sharing group. The instructions on making these load modules available are below.

**Changing STEPLIB in DSNUPROC:** The recommended way of making the release-dependent modules available for utility jobs is to change the STEPLIB in DSNUPROC to include the other release (DSN=DSN810.SDSNLOAD for Version 8, or DSN=DSN910.SDSNLOAD for Version 9), as in the following example:

```
//DSNUPROC PROC LIB='DSN1010.SDSNLOAD',
//      SYSTEM=DSN,
//      SIZE=0K,UID=',UTPROC='
//DSNUPROC EXEC PGM=DSNUTILB,REGION=&SIZE,
//      PARM='&SYSTEM,&UID,&UTPROC'
//STEPLIB DD DSN=&LIB,DISP=SHR;
//      DD DSN=DSN810.SDSNLOAD,DISP=SHR <- coexistence
//SYSPRINT DD SYSOUT=*
b//UTPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//*DSNUPROC PEND          REMOVE * FOR USE AS INSTREAM PROCEDURE
```

**Cross-copy into load libraries:** Another approach, which is not recommended for long-term use, is to cross-copy the release-dependent modules into the load libraries of the other release. For example, copy DSNUT910 into the DB2 10 load libraries, and copy DSNUT101 and all applicable utility-dependent load modules into the Version 9 load libraries. Or, for example, copy DSNUT810 into the DB2 10 load libraries, and copy DSNUT101 and all applicable utility-dependent load modules into the Version 8 load libraries. The problem with this approach is that you must repeat this procedure every time you apply maintenance to these modules. Thus, as with coexistence in general, this approach is only for short-term use.

The following example shows sample JCL to perform a cross-copy from DB2 10 to Version 9 and from Version 9 to DB2 10:

```
//CROSCOPY PROC V10PREF='DSN1010',
//      V9PREF='DSN910',
//      RGN=4096K,SOUT='*'
//* *****
//*   FOR EXECUTION OF IEBCOPY - DB2 POST-INSTALLATION   ***
//* *****
//COPY EXEC PGM=IEBCOPY,REGION=&RGN
//SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//SYSUT4 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//* ***** DB2 TARGET LIBRARIES *****
//*
//V9LOAD DD DSN=&V9PREF..SDSNLOAD,DISP=OLD
//V10LOAD DD DSN=&V10PREF..SDSNLOAD,DISP=OLD
//*
//      PEND
//COEXIST EXEC PROC=CROSCOPY
//SYSIN DD *
COPYMOD INDD=((V10LOAD,R)),OUTDD=V9LOAD
SELECT MEMBER=(DSNUT101) <-- add any utility-dependent modules here
COPYMOD INDD=((V9LOAD,R)),OUTDD=V10LOAD
SELECT MEMBER=(DSNUT910)
```

The following example shows sample JCL to perform a cross-copy from DB2 10 to Version 8 and from Version 8 to DB2 10:


```
//CROSCOPY PROC V10PREF='DSN1010',
//      V8PREF='DSN810',
//      RGN=4096K,SOUT='*'
//* *****
```

```

|      /** FOR EXECUTION OF IEBCOPY - DB2 POST-INSTALLATION          ***
|      /** *****
|      /** COPY EXEC PGM=IEBCOPY,REGION=&RGN
|      /**SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
|      /**SYSUT4 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
|      /** ***** DB2 TARGET LIBRARIES *****
|      /**
|      /**V8LOAD DD DSN=&V8PREF..SDSNLOAD,DISP=OLD
|      /**V10LOAD DD DSN=&V10PREF..SDSNLOAD,DISP=OLD
|      /**
|      /** PEND
|      /**COEXIST EXEC PROC=CROSCOPY
|      /**SYSIN DD *
|      COPYMOD INDD=((V10LOAD,R)),OUTDD=V8LOAD
|      SELECT MEMBER=(DSNUT101) <-- add any utility-dependent modules here
|      COPYMOD INDD=((V8LOAD,R)),OUTDD=V10LOAD
|      SELECT MEMBER=(DSNUT810)

```

**Related concepts:**

 Operation of DB2 utilities in a mixed-release data sharing environment (DB2 Utilities)

**Related reference:**

Load module names for running purchased utilities in coexistence

## Load module names for running purchased utilities in coexistence

Each utility that you purchase has a separate load module that is associated with one of 20 load modules.

When a utility is executed, it is loaded by using its load module, which is listed in the following table. By including in the link list the load module name for those utilities that you want, you can run in coexistence mode without specifying a STEPLIB in the JCL.

*Table 96. DB2 10 utility features*

Feature	Load Module Names
CATMAINT	DSNU10LA
CHECK	DSNU10LB
COPY	DSNU10LC
DIAGNOSE <sup>1</sup>	DSNU10LD
LISTDEF	DSNU10LE
LOAD	DSNU10LF
MERGECOPY	DSNU10LG
MODIFY	DSNU10LH
OPTIONS	DSNU10LI
QUIESCE	DSNU10LJ
REBUILD	DSNU10LK
RECOVER	DSNU10LL
REORG	DSNU10LM
REPAIR	DSNU10LN
REPORT	DSNU10LO
RUNSTATS	DSNU10LP

Table 96. DB2 10 utility features (continued)

Feature	Load Module Names
STOSPACE	DSNU10LQ
TEMPLATE	DSNU10LR
UNLOAD	DSNU10LS
COPYTOCOPY	DSNU10LT
EXEC SQL	DSNU10LU
BACKUP SYSTEM and RESTORE SYSTEM	DSNU10LV

<sup>1</sup>Use this utility only under the direction of IBM Software Support.

Table 97. Core utility load modules that are shipped with the base

DSNU10LA	DSNU10LD	DSNU10LE	DSNU10LI
DSNU10LJ	DSNU10LN	DSNU10LO	DSNU10LR

## Recommendation for group restart in coexistence

If a group restart is necessary while the data sharing group is running in a coexistence environment, issue the START command only for DB2 10 members.

Do not start the Version 8 or DB2 9 members until the DB2 10 members have completed forward log recovery. If a Version 8 or DB2 9 member performs the group restart for a DB2 10 member, the previous version adds pages to the logical page list during the peer-forward recovery phase when it tries to apply redo log records against a release-dependent object.

## Recommendation for SPUFI in coexistence

When you migrate the first member of the data sharing group to DB2 10, you run job DSNTIJSJG, which binds the SPUFI packages in DB2 10.

Binding SPUFI in DB2 10 causes SPUFI to be unavailable to the Version 8 or DB2 9 members. If you attempt to run an SQL statement on a member that has yet to migrate to DB2 10, expect messages that indicate an unavailable resource.

## Migrating an existing data sharing group to DB2 10 conversion mode (from Version 8 or Version 9)

If you have a Version 8 or DB2 9 DB2 data sharing group, and you want a DB2 10 data sharing group, you can migrate to the newer release.

### Before you begin

**Important:** Apply the fallback SPE and stop and restart DB2 9 for every subsystem or data sharing member that you plan to migrate to DB2 10. For data sharing, every member must be started in DB2 9 after the fallback SPE is applied. After migration to DB2 10 new-function mode, any active members that did not start in DB2 9 with the fallback SPE applied prevent DB2 10 from starting. Inactive members that never started with the fallback SPE applied in DB2 9 cannot start in DB2 10 or DB2 9 after migration to DB2 10 completes on any other member.

During the migration to DB2 10, other group members can be active, but they might experience delays or timeouts if they attempt to access catalog objects that

are being updated or that are locked by migration processing. Before beginning the migration process, confirm that Version 8 or DB2 9 is at the proper service level. Also, check your coupling facilities to ensure that the appropriate service levels are installed. Having the wrong service levels installed can result in data corruption. No specific service level requirements exist for CFLEVELs other than 12, but CF levels 13, 14, 15, and 16 are recommended for additional function and performance improvements. Use the z/OS **D CF** command to display the service levels for IBM coupling facilities.

**Important:** Migration to DB2 10 is only supported from Version 8 or DB2 9.

Before you start to migrate your data sharing group:

- Read the information about migration considerations in Changes that might affect your migration from Version 8 or Changes that might affect your migration from DB2 9.
- Read the information in 00C10207 (DB2 Codes).

**Related concepts:**

The scope and uniqueness of DB2 subsystem parameters in data sharing

## Migrating the first member of a group to DB2 10

You must first complete the migration of one member of the data sharing group to DB2 10 before starting any other members at DB2 10. You may choose any member as the first member to migrate to the new release.

### About this task

The DB2I CLISTs are edited when the first member of a data sharing group migrates to DB2 10. The sample jobs are edited when the first member migrates to DB2 10, and they are also edited as part of preparation for enabling-new-function mode for the group.

*Jobs that the migration CLIST tailors:* Jobs that are marked with an asterisk (\*) are modified only when you migrate the first member of a data sharing group.

DSNTIJEX*	DSNTIJGF	DSNTIJRI	DSNTIJTM
DSNTIJIC*	DSNTIJIN*	DSNTIJSG*	DSNTIJUZ
DSNTIJFT	DSNTIJMV	DSNTIJVC*	DSNTIJRT*
DSNTIJFV	DSNTIJRW*	DSNTIJTC*	DSNTIJRV*
DSNTIJCX*	DSNTIJPD*		

**Follow these directions carefully.** The first member of the data sharing group uses DSNTIDXA as its input member name. If you use SAP, specify DSNTIDXB, the SAP-specific CLIST input member, instead of DSNTIDXA. A subsequent member must use a previous member's output member name as its input member name.

### Procedure

To migrate the first member of a data sharing group to DB2 10:

1. Make a plan to migrate the data sharing group in as short a time period as possible. Migrating an existing data sharing group requires careful planning.
2. Apply maintenance through the DB2 10 fallback SPE to all active members.



**Important:** Apply the fallback SPE and stop and restart DB2 9 for every subsystem or data sharing member that you plan to migrate to DB2 10. For data sharing, every member must be started in DB2 9 after the fallback SPE is applied. After migration to DB2 10 new-function mode, any active members that did not start in DB2 9 with the fallback SPE applied prevent DB2 10 from starting. Inactive members that never started with the fallback SPE applied in DB2 9 cannot start in DB2 10 or DB2 9 after migration to DB2 10 completes on any other member.

DB2 10 members cannot start if any one of the active Version 8 or DB2 9 members does not have the fallback SPE applied.

To prepare for fallback, keep the subsystem parameter load module that is used by Version 8 or DB2 9.

3. For the first member to migrate, specify the following settings on installation panel DSNTIPA1:

```
INSTALL TYPE ==> MIGRATE
DATA SHARING ==> YES
```

```
.
DATA SET(MEMBER)NAME ==> this member's output member from V8 or V9
```

```
.
INPUT MEMBER NAME ==> DSNTIDXA or DSNTIDXB
OUTPUT MEMBER NAME ==> this member's output PDS member
```

4. On installation panel DSNTIP0B, specify 1 to indicate that this is the first member of the group to migrate.
5. Complete the installation panels. Specify parameters according to the DB2 subsystem parameters guidelines.
6. Complete all of the steps to migrate to DB2 10 conversion mode.

**Related concepts:**

Subsystem parameters and application defaults in a data sharing environment

## Migrating subsequent members of a group to DB2 10

After you complete the migration of one member of a data sharing group to DB2 10, you can migrate subsequent members of the group.

### About this task

To migrate subsequent members of a group to DB2 10, complete these tasks for each member:

**Related tasks:**

Starting inactive data sharing group members in a new DB2 release

### Running the CLIST for migrating data sharing members

The process of migrating data sharing members to DB2 10 involves running some of the migration jobs. Before you run the migration jobs, tailor them to your environment by running the installation CLIST.

### Before you begin

Be sure to complete the process of migrating the first member of the group before you begin to migrate subsequent members to DB2 10.

### Procedure

To tailor the installation jobs for migrating data sharing members:

1. Invoke the installation CLIST.

2. On installation panel DSNTIPA1, specify the following:

```
INSTALL TYPE ==> MIGRATE  
DATA SHARING ==> YES
```

```
.  
DATA SET(MEMBER)NAME ==> this member's output member from V8 or V9
```

```
.  
INPUT MEMBER NAME ==> first member's output PDS member  
OUTPUT MEMBER NAME ==> this member's output PDS member
```

3. Specify 2 on installation panel DSNTIP0B to indicate that this is not the first member of the group to migrate.
4. Complete the installation panels, specifying parameters according to the DB2 subsystem parameters guidelines.

**Related concepts:**

Subsystem parameters and application defaults in a data sharing environment

**Related tasks:**

Invoking the CLIST

### Connecting DB2 to IMS (optional)

Connecting DB2 to IMS is an optional part of migrating existing data sharing members to a new release. Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

#### Procedure

To connect the IMS attachment facility:

1. Make DB2 load modules available to IMS.
2. Define DB2 to IMS.
3. Define new programs and transactions to IMS.
4. Prepare IMS applications for DB2.
5. Depending on your site, you might also need to:
  - Define DB2 plans for IMS applications.
  - Generate a user language interface.

**Related tasks:**

Connecting the IMS attachment facility

### Connecting CICS to DB2 (optional)

Connecting CICS to DB2 is an optional part of migrating members in a data sharing group. Connecting DB2 to CICS requires that you regenerate several CICS tables with additional entries.

#### About this task

A macro is supplied with CICS to define the connection between CICS and DB2 by using a resource control table (RCT).

Ensure that you coordinate the attachment facility connection with your CICS support group.

#### Procedure

To connect the CICS attachment facility:

1. Recalculate space requirements for the CICS attachment facility.
2. Define your CICS attachment facility parameters using the RCT.

3. Update the CICS system tables.
4. Update the CICS initialization JCL.
5. Coordinate DB2 and CICS security if necessary.
6. Prepare new CICS applications for DB2 if necessary.

**Related tasks:**

 Defining the CICS DB2 connection

## Stopping DB2 activity

Before running any installation jobs to migrate a data sharing member, ensure that all work is stopped on the subsystem.

### Procedure

To stop work on DB2:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for DB2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

The QUIESCE keyword allows DB2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access DB2:

**GUIP**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP**

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct jobs were run for DSNTIJUZ. Ensure that you started DB2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all DB2 9 work is stopped:
  - Make sure no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use `-DSN1 RECOVER INDOUBT` for any indoubt threads.

- Ensure that all utilities are completed or terminated. To ensure that no utility work remains, issue the following command:

#### GUIP

-DSN1 DISPLAY UTILITY(\*)

#### GUIP

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

-DSN1 TERM UTILITY(\*)

- Ensure that no table spaces and index spaces in the DB2 directory (DSNDB01) or the DB2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

#### GUIP

-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(\*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(\*) RESTRICT

#### GUIP

You must have system administrator or system operator authority (specified on installation panel DSNTIPP1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop DB2 by issuing the following command:

#### GUIP

-DSN1 STOP DB2 MODE(QUIESCE)

#### GUIP

A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

#### Related reference:

[➤ -DISPLAY DATABASE \(DB2\) \(DB2 Commands\)](#)

[➤ -DISPLAY THREAD \(DB2\) \(DB2 Commands\)](#)

[➤ -DISPLAY UTILITY \(DB2\) \(DB2 Commands\)](#)

[➤ -STOP DB2 \(DB2\) \(DB2 Commands\)](#)

[➤ -TERM UTILITY \(DB2\) \(DB2 Commands\)](#)

#### Defining DB2 initialization parameters: DSNTIJUZ

Job DSNTIJUZ generates the DB2 data-only subsystem parameter module DSNZPxxx, the application defaults load module (*dsnhdcep*), and the data-only load module DSNHMCID. For migrating members, job DSNTIJUZ only contains a

subset of the steps that are contained in the DSNTIJUZ job for the first migrated member. The application defaults load module, *dsnhdecpl*, is not reassembled for each subsequent migrating member.

## Procedure

To define the DB2 initialization parameters:

1. Save your Version 8 or DB2 9 subsystem parameter module so that it is available in case you need to fall back.
2. Run job DSNTIJUZ.

## Results

The DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

## Establishing subsystem security: DSNTIJRA (optional)

DB2 lets you control access to data within DB2. DB2 also works together with outside security systems, such as RACF, that control access to the DB2 subsystem.

## About this task


Because your DB2 10 subsystem reuses the data objects from the Version 8 or DB2 9 subsystem that you are migrating, you have probably already supplied the protection that those objects need. However, you probably want to protect the new (DB2 10) DB2 data objects.

## Procedure

To establish subsystem security:

1. Customize job DSNTIJRA, as described in the job prolog.
2. Run job DSNTIJRA. Job DSNTIJRA defines the administrative task scheduler started task module to RACF program control and defines the administrative task scheduler as a trusted context in RACF. DSNTIJRA is intended for the site security administrator, and can be run any time prior to installing or migrating to DB2 10.
3. If you have a DB2 data sharing environment, customize and run DSNTIJRA for each member of the group.

## Related concepts:

 [Getting started with DB2 security \(Managing Security\)](#)

## Defining DB2 to z/OS: DSNTIJMV

Job DSNTIJMV completes some of the steps that are required to identify DB2 to z/OS, including updating members of SYS1.PARMLIB and SYS1.PROCLIB.

## About this task

For migrating data sharing members, job DSNTIJMV contains a subset of the steps that are contained in the DSNTIJMV job that is used for the first migrating member. The steps to update the IEAAPFxx and LNKLSTxx members and the steps to update the language procedures are not included in the job for migrating subsequent members.

## Procedure

To define DB2 10 to z/OS:

1. Run job DSNTIJMV. If job DSNTIJMV runs successfully, it produces return codes of 0. Because a rename can fail without setting the return code, verify all renames.
- 2.

### From V9.1

If you are migrating from DB2 9, review the content of the environment variable file that was created by job step DSNTIJR. Adjust the following information as needed:

- CLASSPATH needs to specify the path for the Java class that contains the JAR files for z/OS XML System Services XML schema registration (/usr/include/java\_classes). CLASSPATH cannot specify gxljapi.jar or gxljosrglmp.jar
- LIBPATH needs to specify the path for the native library for z/OS XML System Services (libGXLNVBAT.so).
- STEPLIB needs to specify the name of the DB2 for z/OS run time library.

### From V9.1

## What to do next

Because different sites have different requirements for identifying DB2 to z/OS, DSNTIJMV cannot anticipate all the necessary updates. For this reason, the updates that job DSNTIJMV makes in SYS1.PARMLIB and SYS1.PROCLIB are incomplete. You might have additional procedures of your own to rename, or you might have to provide procedures for both releases, using alias names to indicate the current release. If you changed the DB2 subsystem name, the names of the DB2 address space startup procedures also change. If you made any changes to your Version 8 or DB2 9 procedures (such as data set names), make similar changes to the DB2 10 procedures. You can complete these updates either by making the updates directly in SYS1.PARMLIB and SYS1.PROCLIB or by editing DSNTIJMV.

**Recommendation:** For SYS1.PROCLIB, submit the procedure-update section of DSNTIJMV as necessary. However, before you make the updates, read the information about DSNTIJMV, and examine DSNTIJMV to study the updates that it makes. Edit the updates directly in SYS1.PARMLIB instead of submitting the updates in the DSNTIJMV job.

Before starting DB2, check the private area sizes in the SYS1.PROCLIB update section to ensure that you have enough user private area.

Also, examine the size of the private area on the DB2 startup procedures. If necessary, modify them to satisfy the requirements for EDM pool size, buffers, numbers of open data sets, and the amount of available private address space.

### From V9.1

If you are migrating from DB2 9, the installation CLIST removes the \_CEE\_ENVFILE environment variable from the Language Environment options data set. This action allows the data set to maintain compatibility with the DB2 9

run time environment for the SYSPROC.XSR\_COMPLETE stored procedure. After you migrate to new-function mode, you must add the \_CEE\_ENVFILE environment variable as part of enabling the DB2 10 run time environment, as explained in “Migrating from enabling-new-function mode (from Version 8 or Version 9) to new-function mode” on page 700

◀ From V9.1

#### Related concepts:

➤ Runtime environment for Java routines (DB2 Application Programming for Java)

#### Related reference:

➤ z/OS SETSSI Command (MVS System Commands)

➤ z/OS SETPROG Command (MVS System Commands)

### IPL z/OS

When you migrate to DB2 10 conversion mode (from Version 8 or Version 9), you should complete the z/OS initial program load (IPL) before you start the DB2 subsystem. You can also IPL z/OS before migration if you have made the appropriate updates to the z/OS libraries.

#### Before you begin

Alternatively, you can use the SETSSI, SETPROG APF, and SETPROG LNKLST commands to define the subsystem to z/OS until the next IPL.

You should complete the IPL before or during migration, but IPLs are not necessary for fallback or remigration. Before you begin the IPL for z/OS, ensure that job DSNTIJMV was run.

#### About this task

The load module library SDSNLINK contains the early code. If all of the required maintenance has been applied to your system, the early code is upward compatible with DB2 10. Ensure that the early code pre-conditioning PTFs have been installed on your system before you migrate. The DB2 10 early code is downward compatible with Version 8 or DB2 9. The DB2 10 early code is incompatible with DB2 Version 7.

#### Procedure

To IPL z/OS:

If you are at the appropriate service level for Version 8 or DB2 9, you can plan ahead, do PARMLIB updates (which are necessary at least to update the APF authorization list), and complete the IPL for z/OS whenever convenient, before you begin your migration. Otherwise, IPL z/OS before you start DB2 10.

#### Results

After you complete the IPL for z/OS, message DSN3100I is displayed on the z/OS console, stating that DB2 is ready for the START command.

#### Related reference:

➤ z/OS SETPROG Command (MVS System Commands)

## Starting DB2 10

During migration to DB2 10, start the DB2 subsystem after you run job DSNTIJMV and IPL z/OS.

### Procedure

To start DB2:

1. Start the IRLM. If you have not requested that DB2 automatically start the IRLM, you should start it before you start DB2. Use the following command, where *irlmproc* is the name that you assigned to the IRLM startup procedure:

```
START irlmproc
```

The *irlmproc* is the value that you specified for the PROC NAME option on installation panel DSNTIPI.

If you specified YES for the AUTO START option on installation panel DSNTIPI, DB2 starts the IRLM automatically.

2. Start DB2 from the z/OS console with the following command, where -DSN1 is the subsystem command prefix that you defined for DB2, and *DSNZPxxx* is the name of the DB2 initialization parameter module:

```
-DSN1 START DB2 PARM(DSNZPxxx)
```

If you omit the PARM parameter, and you specified a value in the PARAMETER MODULE field on installation panel DSNTIPO3, that value is used as the parameter module name. If you did not specify a parameter module on panel DSNTIPO3, DB2 uses the default, DSNZPARM.

If you did not run job DSNTIJRT when you migrated the first member of the group and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If DB2 starts successfully, two to five address spaces also start. These address spaces are *ssnm*MSTR and *ssnm*DBM1, possibly *ssnm*DIST, possibly *ssnm*ADMT, and *irlmproc*, where *ssnm* is the DB2 subsystem name, *ssnm*ADMT is the DB2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If DB2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

If DB2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the correct job was run for DSNTIJUZ. Also, check that the subsystem parameter member that you specified (or used by default) when you started DB2 is the one that the DSNTIJUZ job built. Check the JCL for the DB2 startup procedure.

3. If you want to use the TSO SUBMIT command to do housekeeping and migration verification, start TSO (if it is not already started).



4. If you did not enable primary user IDs to issue DB2 commands from the z/OS console or TSO SDSF when you first installed the subsystem, take one of the following actions:

- Grant SYSOPR authority to all primary user IDs that issue DB2 commands from the z/OS console or TSO SDSF. Issue the following command:

```
GRANT SYSOPR TO userid
```

- Define RACF classes to authorize DB2 commands. Use the following statements:

```
SETR CLASSACT(DSNADM)  
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)  
SETR RACLIST(DSNADM) REFRESH  
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)  
SETR RACLIST(DSNADM) REFRESH
```

#### Related reference:

 -START DB2 (DB2) (DB2 Commands)

 START irlmproc (z/OS IRLM) (DB2 Commands)

### Creating additional work file table spaces (optional)

During migration, you have the option of specifying on installation panel DSNTIP9 that additional work file table spaces are to be created for that member.

#### Procedure

If you specified that one or more additional work file table spaces are to be created for this member:

Run job DSNTIJTM.

### Verifying your DB2 10 conversion mode (from Version 8 or Version 9) system (optional)

Verify your DB2 10 conversion mode (from Version 8 or Version 9) system by running some of the sample jobs from the previous release.

#### About this task

If all of the local DB2 objects from your Version 8 or DB2 9 subsystem still exist (that is, if you have not run job DSNTEJ0), follow this procedure.

#### Procedure

To verify your DB2 10 conversion mode (from Version 8 or Version 9) system:

1. Change the JOBLIB statements to point to *prefix*.SDSNLOAD.
2. Ensure that the DSN8EAE1 module that you created when you originally ran the Version 8 or DB2 9 sample jobs is copied to *prefix*.SDSNEXIT. DSN8EAE1 is an EDITPROC that is used by the employee sample table.
3. Edit the Version 8 or DB2 9 sample jobs before running them. Do not run all the sample jobs. Run only the specific jobs and job steps that are listed in the following steps.
4. Test the migration of the IVP phase 2 applications from your previous version:
  - a.

 From V9.1

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH91) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD91) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE91) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF91) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

From V9.1

- a.

From V8

DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D91U.NEWDEPT and DSN8D91U.NEWPHONE are placed in COPY-pending states.

- b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH81) statement in step PH02CS04.
- c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD81) statement in step PH02DS03.
- d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE81) statement in step PH02ES04.
- e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF81) statement in step PH02FS03.
- f. DSNTEJ2P: Run only step PH02PS05.

From V8

- 5. Test the migration of the IVP phase 3 applications from your previous version:
  - a. Do not run job DSNTEJ3C or DSNTEJ3P.
  - b. If you want to test the Version 8 or DB2 9 ISPF-CAF applications under DB2 10, place the Version 8 or DB2 9 SDSNSPFP panel library ahead of the DB2 10 SDSNSPFP panel library in the ISPLIB concatenation. This placement is necessary so that the plans that are migrated from your previous version can be used. Remove the Version 8 or DB2 9 SDSNSPFP library from your ISPLIB concatenation when you are finished testing the Version 8 or DB2 9 IVP applications under DB2 10.

### What to do next

Do not run any other Version 8 or DB2 9 sample jobs.

#### Related tasks:

Ensure that sample objects from your previous release are available

---

## Falling back and remigrating in a data sharing environment

In a data sharing environment, you can fall back from DB2 10 or remigrate one member at a time or all members at the same time.

### Related concepts:

Mixed releases in a DB2 data sharing group

## Falling back in a data sharing environment

If you need to fall back to Version 8 or DB2 9, you can fall back one member of the data sharing group at a time. Other members can continue to run while one member is falling back.

### Before you begin

If all members have already been migrated to the new release, and you fall back one member at a time, the group is running in coexistence mode after the first member falls back.

### Procedure

To fall back to Version 8 or DB2 9:

1. Stop DB2 on the member that is falling back or stop DB2 on all members if you are falling back all members at once.
2. Run job DSNTIJFV to reactivate Version 8 or DB2 9 for that member or for all members.
3. Reconnect TSO, IMS, CICS to Version 8 or DB2 9.
4. Start Version 8 or DB2 9:
  - a. Enter the command **START DB2**:
    - 1) Check for indoubt units of recovery.
    - 2) Check for outstanding restrictive states.
5. Modify your DSNTIJIC job to account for new table spaces that are added to the DB2 catalog in conversion mode (from Version 8 or DB2 9). This step prepares your DSNTIJIC job to be used in fallback mode.

#### From V8

If you migrated to DB2 10 from Version 8, add the following table spaces to the Version 8 DSNTIJIC job:

- DSNDB06.SYSCONTX
- DSNDB06.SYSPLUXA
- DSNDB06.SYSROLES
- DSNDB06.SYSRTSTS
- DSNDB06.SYSTARG
- DSNDB06.SYSTSASC
- DSNDB06.SYSTSUNI
- DSNDB06.SYSXML

#### From V8

**From V9.1**

If you migrated to DB2 10 from DB2 9, add the following table spaces to the DB2 9 DSNTIJIC job:

- DSNDB06.SYSTSASC
- DSNDB06.SYSTSUNI

**From V9.1**

6. Verify Version 8 or DB2 9.
7. Repeat steps 1 through 6 for each member (or all members) of the data sharing group.

**Related concepts:**

Mixed releases in a DB2 data sharing group

**Related tasks:**

Creating an automatic restart policy

## Remigrating in a data sharing environment

You can remigrate one member at a time or all members of a data sharing group.

### Before you begin

Before you remigrate, refer to “Changes that might affect your migration from Version 8” on page 45 or Changes that might affect your migration from DB2 9 because many of those considerations apply to remigrations, too. Whether each consideration applies to your subsystem depends on the type of activity that occurred on your Version 8 or DB2 9 subsystem after fallback.

A plan or package is automatically rebound in DB2 10 when it is executed for the first time after remigration if it was not explicitly bound in Version 8 or DB2 9. However, if you set subsystem parameter ABIND to NO in a data sharing or non-data sharing environment, or to COEXIST in a data sharing environment, automatic rebinds after remigration are disabled. This means that the plan or package from your previous release is the one that runs in DB2 10.

**Recommendation:** Avoid automatic rebinds during migration and remigration. After your remigrated system is stable, you can rebound your packages with PLANMGMT(EXTENDED). If a new package does not perform adequately, you can rebound with SWITCH(PREVIOUS) to return to the old package.

### Procedure

To remigrate your subsystem to DB2 10:

1. Check the integrity of your Version 8 or DB2 9 catalog and directory:
  - Run the DSN1COPY utility with the CHECK option on your catalog table spaces.
  - Run the link checker utility, DSN1CHKR, to ensure that no existing links are broken.
  - Run the queries in member DSNTESQ of *prefix.SDSNSAMP*.

2. Optional: Ensure that your Version 8 or DB2 9 DSNTIJIC job has been modified to copy new DB2 10 catalog table spaces, and then use DSNTIJIC to take an image copy of your Version 8 or DB2 9 catalog. This step is not required, but it is recommended.
3. Stop your Version 8 or DB2 9 subsystem.
4. Reconnect TSO, IMS, and CICS to DB2. Re-establish your DB2 10 logon procedures and JCL, as well as your DB2 10 CICS and IMS connections.
5. Rebuild DB2 10 cataloged procedures. Rename the DB2 10 procedures that were renamed by job DSNTIJFV during fallback. If job DSNTIJFV was not run, you need to rerun job DSNTIJMV. Comment out step 1 (DSNTIMP), which defines DB2 10 to z/OS, and run the job. (You do not need to define DB2 10 to z/OS a second time.)
6. Start DB2 10. Ensure that you are using your DB2 10 subsystem parameter load module.
7. Take an image copy of the DB2 10 catalog by using the DSNTIJIC job.
8. Verify your DB2 10 system.
- 9.

**From V9.1**

If you used the SYSPROC.XSR\_COMPLETE stored procedure in DB2 9, ensure that the WLM environment that is used for running XSR\_COMPLETE is updated to use the DB2 10 code paths. The following parameters in the Java Language Environment (JAVAENV) data set for the WLM environment are affected:

- DB2\_BASE
- JCC\_HOME
- JAVA\_HOME

**From V9.1**

**Related concepts:**

Mixed releases in a DB2 data sharing group

**Related tasks:**

Falling back in a data sharing environment

Re-enabling DB2 data sharing

---

## Migrating a data sharing group to new-function mode

After all active members of a data sharing group are running in DB2 10 conversion mode, you can migrate the group to new-function mode. You cannot use new DB2 10 facilities until the group is in new-function mode.

### Before you begin

Before completing the migration, ensure that all active members are running in DB2 10 conversion mode.

### About this task

Unlike migrating to conversion mode, you migrate the data sharing group to new-function mode by completing a group-wide process on a single member. Other members of the data sharing group can be active when you complete these

steps, but all active members must be running in DB2 10 conversion mode. You can migrate members that remain inactive during this process to the new release at a later time.

### Procedure

To migrate a data sharing group to new-function mode:

Complete the following tasks on a single member: Migrating your DB2 subsystem to new-function mode.

#### Related tasks:

Starting inactive data sharing group members in a new DB2 release

---

## Starting inactive data sharing group members in a new DB2 release

After migration to DB2 10, you can activate data sharing group members that were last started in previous DB2 releases.

### About this task


When you migrate a data sharing group to new function mode, all active members of the data sharing group must be running in DB2 10 conversion mode. However, members that remain inactive when you complete that step can be migrated to DB2 10 and started in the data sharing group at later time.

### Procedure


To start data sharing members that were last started in a previous DB2 release:

1. If the inactive member was deactivated, reactivate it by following the instructions in Restoring deactivated data sharing members (DB2 Data Sharing Planning and Administration).
2. Migrate the inactive member to DB2 10 by following the instructions in Migrating subsequent members of a group to DB2 10.
3. If the member was last started in a DB2 release before DB2 9, run the DSNJCNVB utility to convert the BSDS of the inactive member. If the inactive member was never started in the data sharing group after DB2 Version 7, you must use the DSNJCNVB job from a DB2 9 or a newer release to complete this step.
4. Start the inactive member.
5. Restart active members so that they can record the updated status of the reactivated member.

#### Related concepts:

 Starting a data sharing member (DB2 Data Sharing Planning and Administration)

#### Related tasks:

 Deactivating data sharing members (DB2 Data Sharing Planning and Administration)

#### Related reference:

 DSNJCNVB (DB2 Utilities)

 -START DB2 (DB2) (DB2 Commands)

---

## Testing the data sharing group

When you installed DB2, sample objects were created in job DSNTEJ1. The DSNTESD member of *prefix.SDSNSAMP* contains SQL statements that refer to these objects. Use these SQL statements to test group buffer pool caching, global lock serialization, and concurrency in the data sharing group.

Perform these tests after installing several data sharing members.

### Testing group buffer pool caching

You can use SQL statements in member DSNTESD to verify that the group buffer pool caching operates correctly.

#### Procedure

To verify that the group buffer pool operates correctly:

1. Run SPUIFI on more than one data sharing member, using member DSNTESD as the input data set. Specify AUTOCOMMIT=YES on the SPUIFI panel.

Run SPUIFI on the different members serially, a few seconds apart if possible. (The runs must be close enough together to avoid having DB2 close the page set because of infrequent updates. The default amount of time between updates before DB2 switches the page set from read-write to read-only is 10 minutes, as specified by the RO SWITCH TIME field of installation panel DSNTIPL1. RO SWITCH CHKPTS can also cause the data set to switch to read-only. It is a number of consecutive checkpoints.

By running the SQL statements serially, DB2 detects inter-DB2 read/write interest on the table space and index and uses the group buffer pool.

2. Verify that ITEM\_COUNT increases by five after each run.
3. Issue the following command to determine whether the table space and index are using the group buffer pool:

**GUI**

```
DIS DB(DSN8D10A) SPACENAM(DSN8S10S,XPARTS) LOCKS
```

**GUI**

If the P-lock state is IX or SIX, then the table space and index are group buffer pool dependent, which is the correct state.

4. Issue the following command to display the statistics for GBP0:

**GUI**

```
DIS GBPOOL(GBP0) GDETAIL
```

**GUI**

In the group detail statistics, look for non-zero values in the READS and WRITES values of the display. This indicates that DB2 is using the group buffer pool successfully for caching.

### Testing global lock serialization

Use the SQL statements in member DSNTESD to verify that locks are acquired and released correctly across multiple data sharing members.

#### Procedure

To test global lock serialization:

1. Run SPUFI, using member DSNTESD as input, on **member 1**. Specify AUTOCOMMIT=NO.  
Because you have inserted data into DSN8A10.PARTS but have not committed, **member 1** holds global locks.
2. Run SPUFI, using member DSNTESD as input, on **member 2**. Specify AUTOCOMMIT=NO.  
Because **member 1** holds global locks, **member 2** must wait to perform the insert.
3. In less than one minute, commit on **member 1**. (If you wait too long to commit, **member 2** will experience a lock timeout.)  
The global locks should be released, and **member 2** should be able to proceed. Verify that ITEM\_COUNT has increased by five.

## Testing concurrency

You can use the SQL statements in member DSNTESD to test concurrency within the data sharing group.

### Procedure

To test concurrency:

1. Run SPUFI concurrently on different data sharing members. Specify AUTOCOMMIT=YES.  
Global locking ensures that inserts to DSN8A10.PARTS are coordinated across data sharing members.
2. Verify that ITEM\_COUNT increases by five each time the run completes successfully.

## Testing Sysplex query parallelism

No sample procedure to test Sysplex query parallelism is provided in member DSNTESD. However, you can use your own data to confirm that a single query can be processed on more than one member of the data sharing group.

**Important:** Sysplex query parallelism is deprecated and will be removed in a future release of DB2.

### About this task

Choose an existing query that you know uses CP parallelism, such as a SELECT COUNT(\*) for a table in a large partitioned table space, and use this procedure to force DB2 to split the query across multiple members of the data sharing group.

### Procedure

To test Sysplex query parallelism:

1. Decide which member will be the query coordinator for your test, and make sure that the COORDINATOR field on installation panel DSNTIPK is set to YES for that member.
2. Make sure that all potential assistants have the ASSISTANT field on installation panel DSNTIPK set to YES.
3. Make sure that the query does not include any query restrictions for parallel processing.
4. Run EXPLAIN on the query.



An X in the PARALLELISM\_MODE column of the PLAN\_TABLE output indicates that this query can be split across multiple members.

5. Set buffer pool allocation thresholds on the members that you want considered as possible assistants:

#### GUI

```
ALTER BUFFERPOOL (BPn) VPSIZE(z) VPSEQT(100) VPPSEQT(100) VPXSEQT(100)
```

#### GUI

Ensure that the VPSIZE is large enough to support parallel processing. Start with at least 50 buffers on each query assistant.

6. Make sure that accounting trace class 3 is active on the parallelism coordinator.
7. Run the query.
- 8.

#### PSPI

Inspect the IFCID 0003 trace record. Field QWA01RBN corresponds to the number of assisting members. This value should be greater than zero.

#### PSPI

#### Related tasks:

[Programming for parallel processing \(DB2 Performance\)](#)

#### Related reference:

DSNTIPK: Define group or member panel

[-ALTER BUFFERPOOL \(DB2\) \(DB2 Commands\)](#)

---

## Disabling and re-enabling DB2 data sharing

Disabling DB2 data sharing is a complex procedure and is very disruptive. Do not attempt to disable DB2 data sharing without a thorough understanding of the process.

Do not make disabling DB2 data sharing part of your contingency plans for handling recovery situations. For temporary bypasses to data sharing problems, try moving to one-way data sharing, which involves stopping all but one member and having that member perform the work for the group. If one-way data sharing does not work, your data sharing problem might be resolved by performing a group restart.

The disabling procedure is included in this section for completeness, but it should rarely be used. Situations in which it might be necessary to disable DB2 data sharing are:

- You made a strategic decision to move away from a data sharing environment.
- One-way data sharing is not working.

After you disable DB2 data sharing, only one member of the data sharing group can access the previously shared data. That member is called the *surviving member*. For details, see [What to do when RBA or LRSN limits are reached \(DB2 Administration Guide\)](#).

If you plan to re-enable data sharing for a group, do not change any group-wide information in the BSDS of the surviving member. Group-wide information includes the catalog alias name and the database password. It also includes the DDF name and password information, even if you do not plan to use DDF when you re-enable DB2 data sharing. If you change any of this information, you need to change the information in every member's BSDS before you start the group.

## Disabling data sharing

You should only disable data sharing with caution and with a thorough understanding of the process and results. Very few situations create a need to disable DB2 data sharing, such as if you have data sharing problems and one-way data sharing does not work.

### Before you begin

#### About this task

The procedure to disable data sharing ensures that the most recent versions of all pages are externalized from the group buffer pool to disk. DB2 does not use the group buffer pool after data sharing is disabled. You must ensure that data is written to disk, or else you lose data when you start DB2 after disabling data sharing.

**Important:** Other members' logs are not available to the surviving member after you disable data sharing.

You must also ensure that there is no need to recover data from information that is contained in other members' logs after you disable data sharing. To prevent the surviving member from applying inconsistent updates during recovery processing, a cold start is required to disable data sharing.

**Important:** Do not attempt to go through the installation process to re-enable data sharing after you have disabled it.

### Procedure

To disable data sharing and return to a non-data-sharing environment:

1. Decide which member will be the surviving member of the group. The surviving member is the only member that can access previously shared data.
2. Stop all members by entering the following command for each member of the data sharing group:

**GUIP**

```
STOP DB2 MODE(QUIESCE)
```

**GUIP**

3. Start the surviving member in maintenance mode by using the following command:

**GUIP**

```
START DB2 ACCESS(MAINT)
```

**GUIP**

4. Make sure that data is consistent. Enter the following commands from the surviving member of the group. Do not proceed to the next step until all problems are resolved.
  - DISPLAY GROUP
 

Ensure that the status of the surviving member is ACTIVE and that the status of all other members is QUIESCED. If the status of a non-surviving member is not QUIESCED, take the following actions, depending on the member's status:

    - If the member's status is FAILED, restart and then stop the member.
    - If the member has castout problems, indoubt units of recovery, or outstanding resynchronization problems, start that member in maintenance mode and fix the problem.
  - DISPLAY UTILITY(\*)
 

If any utility work remains for any member of the group, restart that member with ACCESS(MAINT) and either stop the utility or let it finish.
  - DISPLAY DATABASE(\*) SPACENAM(\*) RESTRICT
 

If any restricted table spaces or index spaces (such as write error ranges, recovery pending status, or logical page list entries) exist, recover them from the surviving member.
5. Stop the surviving member by using the following command:

**GUIP**

STOP DB2 MODE(QUIESCE)

**GUIP**

6. Stop any IRLMs that have not stopped by using the following command:

**GUIP**

STOP *irlmproc*

**GUIP**

7. Dismantle the data sharing group.
  - a. Enter the following command to display the structures for the data sharing group:
 

```
D XCF,STRUCTURE,STRNAME=grpname*
```
  - b. For all structures that are still allocated (STATUS:ALLOCATED) and that still have connections (which appear as FAILED PERSISTENT), enter the following command to force the connections off of those structures:
 

```
SETXCF FORCE,CONNECTION,STRNAME=strname,CONNNAME=ALL
```

**Important:** If your site is running z/OS with APAR OA02620 applied, you do not need to force failed-persistent connections off of the lock structure. When you forcibly deallocate the lock structure (see the next step), the system deletes failed-persistent connections to the structure for you.
  - c. Delete all the DB2 coupling facility structures by using the following command for each structure:
 

```
SETXCF FORCE,STRUCTURE,STRNAME=strname
```
  - d. Edit the JCL in job DSNTIJGF to point to the correct BSDS data sets. DSNTIJGF is a change log inventory job that sets up the surviving member for a cold start.

**Important:** Do not change the hex values that appear in the change log inventory CRESTART control statement. They are not real RBA values.

- e. Run job DSNTIJGF.

After you run this job, do not try to restart any of the non-surviving members. None of those members can start successfully.

8. Change the IRLM procedure to SCOPE=LOCAL.
9. Start the surviving member with ACCESS(MAINT). Specify the old DSNZPxxx from the non-data sharing environment, where the DSHARE subsystem parameter is set to NO. If you do not have the old DSNZPxxx or if the surviving member is not the originating member, reassemble the surviving member's subsystem parameters with DSHARE=NO in the invocation of the DSN6GRP macro. Also, comment out all steps from the DSNTIJUZ job except for those that reassemble and link-edit the subsystem parameters.

When you start DB2 after running DSNTIJGF, respond with Y to a cold start prompt (message DSNJ246I on the z/OS console).

This is a cold start because DB2 increases the log RBA to a value higher than any LRSN used while sharing data. From this point on, your RBAs look like LRSNs.

10. Edit and run job DSNTIJFT, if necessary, to ensure that the surviving member's work file database is DSNDB07.  
The surviving member must use DSNDB07 as its work file database. If the work file database for the surviving member is not DSNDB07, drop that work file database and run job DSNTIJFT.
11. Verify that the surviving member works by running a subset of the DB2 10 installation verification sample jobs.
12. To establish a new recovery point, take a full or incremental image copy or non-DB2 backup of all data. Run job DSNTIJIC to image copy the DB2 catalog and directory.

**Recommendation:** Perform this step as soon as possible after data sharing is disabled.

13. Stop and restart DB2 for normal unrestricted access.

## What to do next

After disabling DB2 data sharing, you can continue to use the group attachment name or subgroup attachment name. The group attachment name or subgroup attachment name does not need to be changed to the surviving member's subsystem ID.

### Related concepts:

Data recovery after disabling DB2 data sharing

### Related tasks:

Verifying that installation or migration was successful with the sample applications

## Data recovery after disabling DB2 data sharing

After DB2 data sharing is disabled, you cannot recover to the current point or to a previous point in time if that recovery depends on any portion of the log that was made before you disabled data sharing.

Therefore, if the table space is updated between the time of the copy and the time you disabled data sharing, DB2 does not let you use that copy as the basis for recovery. This is why you should create a new recovery point as soon as possible after you have disabled data sharing.

## Re-enabling DB2 data sharing

Re-enabling DB2 data sharing involves a subset of the original tasks that were required to enable data sharing. You cannot use the enabling process of installation to re-enable DB2 data sharing.

### About this task

The following output from the original DB2 data sharing enabling procedure remains intact after disabling DB2 data sharing and does not need to be re-created or re-specified:

- Data sharing subsystem parameters (output from the CLIST processing when enabling data sharing)
- XCF definitions
- Coupling facility definitions
- RACF definitions
- DB2 catalog and directory

### Procedure

To re-enable DB2 data sharing:

1. Edit the JCL in job DSNTIJGF.

DSNTIJGF is a change log inventory job that sets up the BSDS of the surviving member for data sharing.

2. Run job DSNTIJGF.

3. Change the IRLM procedure to SCOPE=GLOBAL.

4. Start the surviving member with the subsystem parameters that were used when data sharing was originally enabled.

During startup, you are asked to start all other members that were not quiesced at the time that you disabled DB2 data sharing. You must start all these members.

5. Edit and run job DSNTIJFT on the surviving member to re-create the work file database for data sharing.

See the directions in the prologue of job DSNTIJFT for information about editing this job to re-enable DB2 data sharing.

---

## Renaming a member by performing an IPL

If you want to rename a member of the data sharing group, you should do so either before enabling DB2 data sharing or during the process of enabling DB2 data sharing. Because DB2 must be shut down during the enabling process, you can perform the tasks that are necessary to rename the member at the same time.

### About this task

Renaming a member is an activity that you should plan for very carefully. Because every installation has a different configuration, this procedure is not guaranteed to be complete.

In the following renaming example procedure, the member name for DB2P is changed to DB1A to conform to the naming convention for data sharing that is used in this publication. If you choose to do any of the following tasks, you must IPL z/OS to pick up the changes.

## Procedure

To rename a data sharing member:

1. Modify the IEFSSN $xx$  member for this subsystem to include the group attachment name. To avoid having to modify JCL for all your jobs, use the existing subsystem name as the group attachment name. This step is necessary to ensure that there are no problems when the call attachment and TSO attachment facilities try to use the group attachment name.

**Example:** If the existing IEFSSN $xx$  member looks like:

```
DB2P,DSN3INI,'DSN3EPX,?'
```

Change it to look like:

```
DB2P,DSN3INI,'DSN3EPX,?,S,DB2P'
```

2. Add new IEFSSN $xx$  definitions for the new name and prefix:

```
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB2P'
```


```
DJ1A
```

Optionally, you can use the z/OS command SETSSI to add the new IEFSSN $xx$  statements without an IPL. You can add the new statements when you add the definitions for the new names or later during the enabling process. Do not forget to add these names to the IEFSSN $xx$  member before you IPL again.

The command prefix -DB1A is not a subset or a superset of DB2P's command prefix. For example, ?DB1A is invalid in this context.

3. Make sure that RACF definitions are in place to handle the new subsystem names. Add the correct names to the following tables:
  - The RACF router table
  - The started procedures table (ICHRIN03), if used

### Related tasks:

 [Changing the high-level qualifier for DB2 data sets \(DB2 Administration Guide\)](#)

---

## Renaming a member by stopping DB2

If you want to rename a member of the data sharing group, you should do so either before or while enabling DB2 data sharing. Because DB2 must be shut down during the enabling process, you can perform the tasks that are necessary to rename the member at the same time.

### Before you begin

Renaming a member is an activity that you should plan for very carefully. Because every installation has a different configuration, this procedure is not guaranteed to be complete.

### About this task

You can do the following tasks when you bring down the DB2 subsystem for the enabling procedure.

## Procedure

To rename a member by stopping DB2:


1. Define the correct profile names for the DSNR class.
2. Replicate existing PERMIT commands to allow users and groups to access the new profiles.
3. Complete the installation panels for enabling data sharing. (You cannot change the subsystem name on the installation panels.)  
**On installation panel DSNTIPH, modify the archive prefix names to include the member name, like DB2PCAT.DB1A.ARCLG1.** Specify the old subsystem name (for example, DB2P) as the group attachment name.
4. Stop DB2 with MODE(QUIESCE).
5. Run job DSNTIJUZ to assemble and link-edit the new subsystem parameter data set (DSNZPxxx) and DSNHDECP.
6. Rename the BSDS and active log data sets with the new prefix, like DB2PCAT.DB1A.BSDS01.
7. Update the BSDS with the renamed log data sets. **Include the same RBA ranges as the original active log data sets:**
  - a. Run the utility print log map (DSNJU004) to obtain the start and end RBAs.
  - b. Use access method services to rename the log data set.
  - c. Run the utility change log inventory (DSNJU003) to delete the active logs with the old names.
  - d. Run the utility change log inventory (DSNJU003) to add the renamed active logs with the correct ranges. You do not need to add the archive log data sets, because the archive log data sets that you specified on panel DSNTIPH will replace them.
8. If necessary, increase the size of the BSDS.
9. If necessary, increase the size of the SYSLGRNX table space.
10. Rename the startup procedures. For example, change DB2PMSTR to DB1AMSTR. Do not forget to change the BSDS names to the new names in the *ssnm*MSTR startup procedure.
11. Make sure that CICS can connect to the new subsystem. There are several ways of doing this, depending on which level of CICS you are running. Here are a couple of techniques:
  - Change the CICS DB2CONN to use the new DB2 subsystem name, reassemble, and link-edit.
  - Modify the JCL for CICS to include the new subsystem name on the INITPARM.
12. Make sure that IMS can connect to the new subsystem.
13. Enter the command START DB2 and continue with the rest of the enabling process.

### Related tasks:

Enabling DB2 data sharing

Increasing the size of the BSDS

Increasing the size of the SYSLGRNX table space

 [Changing the high-level qualifier for DB2 data sets \(DB2 Administration Guide\)](#)





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## Chapter 8. Verifying that installation or migration was successful with the sample applications

You can use the DB2 DB2 10 sample applications to verify either installation or migration to new-function mode. These sample applications are also called installation verification procedures (IVPs).

### About this task

**Attention:** Do not run the DB2 10 IVP jobs unless your subsystems are in DB2 10 new-function mode.

#### Recommendations:

- During verification, run all sample applications under the same user ID. This user ID must have SYSADM authority. Otherwise, errors might occur.
- Run the IVP jobs with DB2 started in unrestricted mode because restricted mode (ACCESS(MAINT)) does not allow use of stored procedures and user-defined functions.
- If you are installing a data sharing group, run the IVP jobs after you install or migrate the originating system. You do not need to run the IVP jobs after you enable the originating system or after you install a new data sharing member.
- You must use the same compiler for each job. For example, if you use IBMCOB for DSNTEJ2C, you must use IBMCOB for all COBOL verification programs.
- After you designate a client and server subsystem, run all verification jobs on the same client and server subsystems.

### Procedure

To verify a successful installation or migration:

1. For testing purposes, identify one local subsystem to act as the client and one remote subsystem to act as the server. Both subsystems must be at DB2 10. Although not recommended, the client and server subsystem can be the same if a remote subsystem is not available for testing.
2. Ensure that the client subsystem is specified in the DB2 LOCATION NAME field of installation panel DSNTIPR.
3. Ensure that the server subsystem is specified in the REMOTE LOCATION field of installation panel DSNTIPY.
4. Identify the IVP jobs that you need to run based on the attachment facilities you installed, the languages you use, and whether the sample objects exist.
5. Edit the sample jobs as necessary based on the information that is provided for the jobs.
6. Run the necessary IVP jobs.

### What to do next

When you complete the verification procedure, save the verification objects. You will need them when you migrate to the next release of DB2.

#### Related tasks:

Enabling DB2 data sharing

Migration step 30: Verify your DB2 10 conversion mode (from Version 8 or Version 9) system (optional)

## Installation verification phases and programs

In each phase of the installation verification procedure (IVP), you must run specific programs. These programs need to be run sequentially by phase because the output of some jobs is used as input for subsequent jobs.

The IVP consist of eight phases: seven verification phases and one cleanup phase that drops sample objects (Phase 0). Each of the seven verification phases tests one or more DB2 functions or attachment facilities. Certain phases of the verification procedure might not apply to the environment in which your DB2 subsystem operates, so you might not need to complete all phases. In some cases, the steps and return codes differ when you run the fallback release and DB2 10 phases. These differences are noted under the proper phase.

Run Phase 0 (job DSNTEJ0) only if you want to remove all the verification processing that you have completed so that you can begin the verification procedure again. Phases 1-3 test the TSO and batch environments, including user-defined functions. Phase 4 is for IMS users only, and Phase 5 is for CICS users only. Phase 6 sets up the sample tables and stored procedures for distributed processing. Phase 7 tests the LOB feature with sample tables, data, and programs.

*prefix*.SDSNSAMP contains the program source.

Each phase consists of one or more batch jobs and some phases also consist of online activities. You run the same jobs regardless of whether you are installing DB2 for the first time or migrating your DB2 10 catalog to new-function mode. The installation CLIST tailored and loaded these jobs into *prefix*.NEW.SDNSAMP, which you created during your installation or migration to new-function mode. The verification jobs use source code and data from the untailored *prefix*.SDSNSAMP library. Most DB2 sample objects have unique names to differentiate them from objects of previous releases. This allows sample programs for multiple releases to coexist. The JCL that is provided for IMS sets up transaction identifiers for the sample applications.

The following table shows the programs and jobs that are run in each phase of the verification procedure. These jobs are designed to run with minimal interaction on your part. However, before running these jobs, you should make any modifications that are suggested in the information about each job.

*Table 98. Relationship of IVP phases to programs*

Phase	Job	Program	Description
0	DSNTEJ0	DSNTIAD	Remove sample applications and sample schema authorizations
1	DSNTEJ1	DSNTIAD	Create tables
		DSN8CA	Assembler interface to call attach facility
		DSN8EAE1	Edit exit routine
		DSN8HUFF	Huffman compression exit routine
		DSNUTILB	Utilities
	DSNTEJ1L	DSNTEP2	Dynamic SQL program

Table 98. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
	DSNTEJ1P	DSNTEP2	Dynamic SQL program
	DSNTEJ1S <sup>1</sup>	DSNHSP	See note 1
	DSNTEJ1T <sup>2</sup>	DSNUPROC	See note 2
	DSNTEJ1U	DSNTIAD	Create Unicode table
		DSNUTILB	Load Unicode table
		DSNTEP2	Select Unicode table
2	DSNTEJ2A	DSNTIAD	Grant execution
		DSNTIAUL	Unload and load tables
		DSNUTILB	Utilities
	DSNTEJ2C	DCLGEN	Generate declarations
		DSNTIAD	Grant execution
		DSN8BC3	COBOL phone application
	DSNTEJ2D	DSNTIAD	Grant execution
		DSN8BD3	C phone application
	DSNTEJ2E	DSN8MDG	Prepare error message routine
		DSN8BECL	Prepare classes used by C++ phone application
		DSNTIAD	Grant execution
		DSN8BE3	C++ phone application
	DSNTEJ2F	DSNTIAD	Grant execution
		DSN8BF3	Fortran phone application
	DSNTEJ2H	DSN8EDXR	Sample application to format and display an XML record
		DSN8EDXU	Sample application to format and update an existing XML record
		DSN8EDXI	Sample application to insert an XML record
		DSN8EDXD	Sample application to delete an XML record
	DSNTEJ2P	DCLGEN	Generate declarations
		DSNTIAD	Grant execution
		DSN8BP3	PL/I phone application
	DSNTEJ2U	DSNTIAD	Register sample user-defined functions
		DSN8DUAD	C program for ALTDATE function (current date)
		DSN8DUCD	C program for ALTDATE function (given date)
		DSN8DUAT	C program for ALTTIME function (current time).
		DSN8DUCT	C program for ALTTIME function (given time)
		DSN8DUCY	C program for CURRENCY function

Table 98. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
		DSN8DUTI	C program for TABLE_NAME, TABLE_SCHEMA, and TABLE_LOCATION functions
		DSN8EUDN	C++ program for DAYNAME function
		DSN8EUMN	C++ program for MONTHNAME function
		DSNTEP2	Dynamic SQL program
		DSN8DUWF	User-defined table function sample
		DSN8DUWC	C program on client for user-defined table function sample
3		SPUFI	Sample SPUFI input
	DSNTEJ3C	DSNTIAD	Grant execution
		DSN8CC	COBOL interface to call attachment facility
		DSN8SCM	COBOL connection manager
		DSN8SC3	COBOL phone application
		DSN8HC3	COBOL organization application
	DSNTEJ3M	DSNTIAD	Drop sample MQT objects, create sample MQT objects, grant authority to MQT objects, and populate sample MQT tables
		DSNUTILB	Produce statistics for MQT
		DSNTEP2	Process EXPLAINs on sample MQT tables
	DSNTEJ3P	DSNTEP2	Dynamic SQL application
		DSNTIAD	Grant execution
		DSN8SPM	PL/I connection manager
		DSN8SP3	PL/I phone application
4	DSNTEJ4C	DSNTIAD	Grant execution
		DSN8ICx	Organization application
		DSN8MCx	Copy code
	DSNTEJ4P	DSNTIAD	Grant execution
		DSN8IPx	Organization, project applications
		DSN8MPx	Copy code
5	DSNTEJ5A	DSNTIAC	CICS SQLCA formatter front-end
	DSNTEJ5C	DSNTIAD	Grant execution
		DSN8CCx	Organization application
		DSN8MCx	Copy code
	DSNTEJ5P	DSNTIAD	Grant execution
		DSN8CPx	Organization, project applications
		DSN8MPx	Copy code

Table 98. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description	
6	DSNTEJ6	DSNTIAD	Update location column in the department table to the sample location entered at installation time	
	DSNTEJ6D	DSN8ED1	Compile, link-edit, bind, and run a sample application program that calls a stored procedure	
	DSNTEJ6O	DSN8DTS1, DSN8DTS2	Create and run sample for IBM Text Search for DB2 for z/OS	
	DSNTEJ6P	DSN8EP1	Invoke the sample stored procedure	
	DSNTEJ6R	DSN8ED8	Compile, link-edit, bind, and run a sample application that calls DSNUTILU, the DB2 Utilities Unicode parser stored procedure	
	DSNTEJ6S	DSN8EP2	Create sample stored procedure	
	DSNTEJ6T	DSN8ED2	Register, prepare, and bind the stored procedure sample application	
	DSNTEJ6U	DSN8EPU	Compile, link-edit, bind, and run a sample application that calls DSNUTILS, a stored procedure for executing DB2 utilities	
	DSNTEJ6V		DSN8EE0	C++ class that calls DSNTIAR
			DSN8EE1	C++ class that calls DSNUTILS
			DSN8EE2	C++ client for DSN8EE1
	DSNTEJ6W	DSN8ED6	Call the WLM_REFRESH stored procedure	
	DSNTEJ6Z	DSN8ED7	C class that calls DSNWZP stored procedure	
	DSNTEJ61	DSN8EC1	Create sample ODBA stored procedure	
	DSNTEJ62	DSN8EC2	Invoke sample ODBA stored procedure	
	DSNTEJ63	DSN8ES1	Run sample external SQL procedure that calculates employee earnings.	
	DSNTEJ64	DSN8ED3	Call the sample external SQL procedure, DSN8ES1 from a client	
	DSNTEJ65		DSN8ED4	Call the external SQL procedure processor, DSNTPSMP
			DSN8ES2	Run external SQL procedure that calculates employee bonuses
			DSN8ED5	Call external SQL procedure, DSN8ES2
DSNTEJ66		DSN8ES3	Create and alter a sample native SQL procedure	
		DSN8ED9	Prepare and execute a sample caller of the sample native SQL procedure	
7	DSNTEJ7	DSNTIAD	Create sample LOB table	

Table 98. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
		DSNTIAD	Create synonyms, grant access to LOB tables
		DSNUTILB	Load sample LOB table
		DSNUTILB	Produce statistics for LOB table spaces
	DSNTEJ71	DSNTIAD	Grant access to plans
		DSN8DLPL	Populate sample LOB table with BLOB data
		DSN8DLTC	Verify contents of LOB table
	DSNTEJ73	DSNTIAD	Grant access to plans
		DSN8DLRV	C employee resume application
	DSNTEJ75	DSNTIAD	Grant access to plans
		DSN8DLPV	C employee photo application
	DSNTEJ76	DSN8CLPL	Create COBOL LOB sample table
		DSN8CLTC	Create synonyms, grant access to COBOL LOB tables
	DSNTEJ77	DSN8CLRV	Load sample COBOL LOB table
	DSNTEJ78	DSN8CLPV	Produce statistics for COBOL BLOB table spaces

**Notes:**

1. Job DSNTEJ1S, which contains the sample JCL to run the schema processor, is not a part of the sample applications to verify installation.
2. Job DSNTEJ1T, which adds rows to SYSIBM.SYSSTRINGS for character conversion purposes, is not a part of the sample applications to verify installation.

**Related concepts:**

Printing options for the sample application listings

**Related tasks:**

Falling back to DB2 9

 [Creating a schema by using the schema processor \(DB2 Administration Guide\)](#)

## Planning for verification

Before performing any of the verification phases, you must make certain decisions about your verification strategy.

### About this task

DB2 system administrators and system administrators for ISPF, TSO, batch, IMS, and CICS must be involved in these decisions.

### Procedure

To prepare for verification

- Determine the verification phases that you plan to perform.

Examine the description of each verification phase in this topic, and determine which phases apply to your needs.

- Identify any phases that you want to modify before you perform them.

Verification is designed to run with little interaction on your part. This topic does not discuss how to modify any of the phases, but you can adapt any of the seven phases to your needs. If this is your intent, identify and describe any modifications you plan to make.

- Establish additional testing steps to complete the verification.

The verification phases and the jobs that you run to perform them are valuable tools for testing DB2. They are not a substitute for a thorough subsystem test. You must plan and perform your own additional testing to complete the verification. To help you assess which additional tests might be necessary, examine the sample applications that are provided with DB2.

- Start any DB2 databases that are not currently started.

---

## COBOL options to use with the installation verification procedures

The DB2 COBOL samples can be run with some compiler options, which control compilation.

IBM tested these options, which are shown in the table below.

If you have a problem executing the DB2 COBOL samples, ensure that your compiler options are consistent with the Enterprise COBOL options in the table below. Remember that if you are using CICS, the options that you need to use depend on the CICS environment. To verify that you are using the correct options in your CICS environment, refer to COBOL programming restrictions and requirements.

*Table 99. Enterprise COBOL options*

---

ADV	NOEXIT	NOTYPECHK
BUFSIZE(4096)	NOFASTSRT	NOVBREF
DATA(31)	NOFLAGMIG	NOWORD
FLAG(I)	NOFLAGSTD	NOXREF
INTDATE(ANSI)	NOIDLGEN	NUMPROC(NOPFD)
LANGUAGE(EN)	NOLIB	OBJECT
LINECOUNT(60)	NOLIST	OUTDD(SYSOUT)
NOADATA	NOMAP	PGMNAME(LONGUPPER)
NOAWO	NONAME	QUOTE
NOCMPR2	NONUMBER	RENT <sup>3</sup>
NOCOMPILE(S)	NOOFFSET	RMODE(AUTO)
NOCURRENCY	NOOPTIMIZE	SIZE(MAX)
NODBCS	NOSEQUENCE	SOURCE
NODECK	NOSSRANGE	SPACE(1)
NODUMP	NOTERM <sup>1</sup> or TERM <sup>2</sup>	TRUNC(STD)
NODYNAM	NOTEST	ZWB

---

**Note:**

<sup>1</sup> Refers to jobs DSNTJ2C, DSNTJ3C, and DSNTJ4C only.

<sup>2</sup> Refers to job DSNTJ5C only.

<sup>3</sup> See the CICS documentation for actual options to use.

---

For more detailed instructions, see Enterprise COBOL for z/OS and Language Environment Programming Guide (z/OS Language Environment Programming Guide).

**Related reference:**

 DSNH (TSO CLIST) (DB2 Commands)

## C and C++ language options to use with the installation verification procedures

The DB2 C and C++ samples can be run with some compiler options.

These options, which were tested by IBM, are shown in the following tables.

If you have a problem executing the DB2 C and C++ samples, ensure that your compiler options are consistent with the options in the following tables.

*Table 100. C language options*

NOAGGR	NOEVENTS	NOHWOPTS	NOMEMORY	NOPPONLY
NOALIAS	EXECOPS	NOINLINE <sup>3</sup>	NESTINC(255)	REDIR <sup>1</sup>
ARGPARSE <sup>1</sup>	NOEXPMAC	LIST	OBJECT	NORENT
NOCHECKOUT <sup>2</sup>	NOEXPORTALL	NOLOCALE	NOOE <sup>1</sup>	NOSEARCH
NOCSECT	FLAG(I)	NOLONGNAME	NOOFFSET	NOSHOWINC
NODECK	NOGONUMBER	NOLSEARCH	NOOPTIMIZE	SOURCE
NODLL	HALT(16) <sup>1</sup>	MAXMEM(2000) <sup>4</sup>	PLIST(HOST) <sup>1</sup>	SPILL(128) <sup>4</sup>
NOSSCOMM	START	TARGET(LE)	TERMINAL	NOTEST <sup>5</sup>
NOUPCONV	XREF			

**Note:**

- <sup>1</sup> This option is used by IBM C/C++ for z/OS.
- <sup>2</sup> NOPPTRACE, PPCHECK, GOTO, ACCURACY, PARM, NOENUM, NOEXTERN, TRUNC, INIT, NOPORT, GENERAL.
- <sup>3</sup> AUTO, NOREPORT, 100, 1000.
- <sup>4</sup> This option is used only by IBM AD/Cycle C/370 V1R2.
- <sup>5</sup> SYM, BLOCK, LINE, NOPATH.

The table below contains the C++ language options.

*Table 101. C++ language options*

ARGPARSE	NOIDL <sup>1</sup>	NESTINC(255) <sup>2</sup>	NOSHOWINC	TERMINAL
NOATTRIBUTE	NOINFO	OBJECT	NOSOM	NOTEST
NOCSECT	NOINLRPT	NOOE <sup>2</sup>	SOMEINIT	XREF
EXECOPS	LANGLVL(EXTENDED)	NOOFFSET	NOSOMGS	HALT(16)
NOEXPMAC	NOLIST	OPTIMIZE(0)	SOURCE	MEMORY <sup>2</sup>
NOEXPORTALL	NOLOCALE <sup>2</sup>	PLIST(HOST) <sup>2</sup>	NOSRCMSG	NOSEQUENCE
FLAG(I)	LONGNAME	NOPPONLY	START <sup>2</sup>	TEMPINC
NOGONUMBER	MARGINS	REDIR	TARGET(LE) <sup>2</sup>	

**Note:**

- <sup>1</sup> This option is used by IBM C/C++ for MVS/ESA V3R1 and subsequent releases.
- <sup>2</sup> This option is used by IBM C/C++ for z/OS and subsequent releases.

The installation CLIST customizes C++ compiler parameters in sample job DSNTEJ2E if you have specified C++ for MVS/ESA V3R2 or a subsequent release on panel DSNTIPU.



---

## PL/I options to use with the installation verification procedures

The DB2 PL/I samples can be run with some compiler options, which control compilation.

These options, which were tested by IBM, are shown in the table below.

If you have a problem executing the DB2 PL/I samples, ensure that your compiler options are consistent with these options.

*Table 102. Enterprise PL/I options*

CHARSET(60,EBCDIC)	LINECOUNT(55)	LMESSAGE	MARGINS(2,72,0)	NOAGGREGATE
NOATTRIBUTES	NOCOMPILE(S)	NOCOUNT	NOESD	NOFLOW
NOGONUMBER	NOGOSTMT	NOGRAPHIC	NOIMPRECISE	NOINCLUDE
NOINTERRUPT	NOLIST	NOMAP	NOMARGINI	NONEST
NONUMBER	NOOFFSET	NOOPTIMIZE	NOSTORAGE	NOSYNTAX(S)
NOTERMINAL	NOXREF	OBJECT	ODECK	SEQUENCE(73,80)
SIZE(506756)	SOURCE	STMT		

---

## Phase 0: Deleting the sample objects (DSNTEJ0)

Phase 0 consists of one job, DSNTEJ0. It frees all plans, drops all objects, and deletes data sets so that Phase 1 can be run again.

Run Phase 0 (job DSNTEJ0) only if you want to remove all the verification processing that you have done so far so that you can begin the verification procedure again. When you complete the verification procedure, save the verification objects; you need them when you migrate to the next release of DB2.

If a sample application abends while running a utility, ensure that the utility is terminated before attempting to rerun the job.

Even when DSNTEJ0 runs successfully, some of the FREE, DROP, and DELETE commands often fail because the object was not created earlier. You can ignore these errors, even though they might generate return codes of 8 or 12. Check other errors.

If DSNTEJ0 runs successfully, it produces the return codes that are shown in the table below.

*Table 103. DSNTEJ0 return codes*

Step	PROCSTEP	Return code
PH00S01		0000, 0008, or 0012
PH00S02		0000, 0004, or 0008
PH00S03	DSNUPROC	0004 or 0008
PH00S04		0000, 0004, or 0008
PH00S05		0000, 0004, or 0008
PH00S06		0000, 0004, or 0008
PH00S07		0000, 0004, or 0008
PH00S08		0000, 0004, or 0008


If this job fails or abends, ensure that the user that is specified on the JOB statement is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to DB2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups. Then correct any other problems, and rerun the job from the last successful step.

If the subsystem data sets were deleted before the DB2 sample objects are deleted, you must delete the data sets by using access method services commands or TSO commands. In all of the following examples, *vcatalog* is the catalog alias name that you specified for the CATALOG ALIAS field on installation panel DSNTIPA2. The *y* is either I or J.

The following access method services commands, which can be executed under TSO, delete the DB2 10 sample data sets:

```
DELETE 'vcatalog.DSNDBD.DSN8D10A.*.y0001.*'  
DELETE 'vcatalog.DSNDBC.DSN8D81L.*.y0001.*'  
DELETE 'vcatalog.DSNDBD.DSN8D10P.*.y0001.*'  
DELETE 'vcatalog.DSNDBC.DSN8D10U.*.y0001.*'  
DELETE 'vcatalog.DSNDB04.STAFF.y0001.A001'  
DELETE 'vcatalog.DSNDB04.TESTSTUF.y0001.A001'  
DELETE 'vcatalog.DSNDBC.DSN8D81E.*.y0001.*'  
DELETE 'vcatalog.DSNDBC.DSN8D81Y.*.y0001.*'  
DELETE 'vcatalog.DSNDBC.DSN8D81X.*.y0001.*'
```

**Related reference:**

 -TERM UTILITY (DB2) (DB2 Commands)

---

## Phase 1: Creating and loading sample tables

Phase 1 of installation or migration verification consists of four jobs: DSNTJEJ1, DSNTJEJ1L, DSNTJEJ1P, and DSNTJEJ1U.

DSNTJEJ1 invokes program DSNTIAD, which creates objects during the verification procedure. Run DSNTIEJ1 before running any other sample jobs.

DSNTJEJ1L and DSNTJEJ1P prepare and invoke program DSNTPEP2, which lists the contents of the sample tables. The difference between the jobs is that DSNTJEJ1P requires the PL/I compiler and allows you to customize DSNTPEP2.

DSNTJEJ1U creates, populates, and tests a sample Unicode database.

### Job DSNTJEJ1

Job DSNTJEJ1 creates all objects that are to be used by the sample verification jobs. Run this job before any other verification job.

This job creates a sample edit exit routine and module called DSN8EAE1. It then processes SQL statements that cause DB2 to load and execute the module. If the module resides in a library that DB2 accesses from the link list or LLA, DSNTJEJ1 might fail at job step PH01S13 with abend S04E reason code 00E40318 because of unavailable resource (reason code 00C9008A). In this event, refresh the link list or LLA and then restart DSNTJEJ1 at job step PH01S13 (PROCSTEP DSNUPROC).

If reason code 00C9008A continues to occur, do one of the following:

- Restart DB2 and run the job again.
- If you are using a partitioned data set (PDS) for the DSNEXIT data set, run IEBCOPY to compress the data set when no application is using the DSNEXIT data set.

**From V8** If you are migrating from DB2 Version 8 and you set the RRF subsystem parameter to ENABLE, use DSN8EAE9 rather than DSN8EAE1 as the name of the sample edit exit routine and module. Setting the RRF subsystem parameter to ENABLE specifies that newly created table spaces are to store data in reordered row format. If DB2 has already loaded the DSN8EAE1 edit exit routine for DB2 Version 8, sample job DSNTEJ1 might fail in job step PH01S13 with ABEND0C4 reason code 11. The failure occurs because the DB2 Version 8 DSN8EAE1 module supports only the basic row format. DSN8EAE1 is automatically changed to DSN8EAE9 in job DSNTEJ1 when you run the installation CLIST in ENFM mode.

**From V8**

The job consists of the following steps.

*Table 104. Steps in job DSNTEJ1*

Step	Function
1-4	Creates all objects (storage group, databases, table spaces, tables, indexes, and views) that are used by the samples.
5	Drops synonyms.
6	Creates synonyms and grants authorization on objects to PUBLIC AT ALL LOCATIONS. This step creates synonyms for the sample tables, indexes, and views, so that the currently running authorization ID can execute the sample application and grant appropriate authority. The sample dynamic SQL program DSNTIAD processes the DB2 object definitions in this step and several others.
7	Uses the ASMCL procedure to create DSN8EAE1, an edit exit routine.
	<b>From V8</b> If you migrated from DB2 Version 8, verify that this routine is called DSN8EAE9. <b>From V8</b>
8	Assembles and link-edits DSNHUFF.
9	Assembles and link-edits DSN8FPRC, a sample field procedure.
10	Prepares the sample call attachment facility assembler interface. You must link-edit ISPLINK, the ISPF interface module, with this CAF sample load module. To do this, ensure that the link-edit SYSLIB statement that retrieves the ISPF load module library in procedure DSNHASM is not commented out.
11	Creates the sample utility list.
12	Loads the programming-related tables by using the LOAD utility.
13	Loads the sample tables by using the LOAD utility.
14	Checks data for referential integrity.
15	Establishes a quiesce point by using both log and image copies.
16	Makes an image copy of all the sample tables by using the COPY utility.
17	Establishes another quiesce point by using only image copies.

Table 104. Steps in job DSNTEJ1 (continued)

Step	Function
18	Reorganizes a table space and compiles statistics on all table spaces by using the REORG and RUNSTATS utilities.
19	Performs a REORG TABLESPACE with SHRLEVEL CHANGE.
20	Loads the sample tables by using the LOAD utility.
21	Sets the CURRENT RULES register and adds a check constraint using ALTER TABLE.
22	Checks data for referential integrity.
23	Checks data for check integrity.
24-27	Performs the operations in steps 15-18 except for the REORG on partition 3 of the Employee table space.
28	Unloads data from a partitioned table.
29	Reduces the partition key on the fourth partition of table space DSN8S81E.
30	Processes an online schema change to add a fifth partition to table space DSN8S81E.
31	Reorganizes a partitioned table space.
32	Performs various online schema changes, including lengthening a character field and converting an integer field to a decimal field.
33	Reorganizes table spaces DSN8S91R and DSN8S91S to reset advisory REORG-pending (AREO) status

If DSNTEJ1 runs successfully, it produces the return codes that are shown in the following table.

Table 105. DSNTEJ1 return codes

Step	PROCSTEP	Return code
PH01S01		0000
PH01S02		0000
PH01S03		0000
PH01S04		0000
PH01S05		0000
PH01S06		0000
PH01S07	ASM LKED	0000 0000
PH01S08	ASM LKED	0000 0000
PH01S09	ASM LKED	0000 0000
PH01S10	PC ASM LKED	0004 0000 0000
PH01S11	IEBGENER	0000
PH01S12	DSNUPROC	0000
PH01S13	DSNUPROC	0004

Table 105. DSNTEJ1 return codes (continued)

Step	PROCSTEP	Return code
PH01S14	DSNUPROC	0000
PH01S15	DSNUPROC	0000
PH01S16	DSNUPROC	0000
PH01S17	DSNUPROC	0000
PH01S18	DSNUPROC	0000 or 0004
PH01S19	DSNUPROC	0000
PH01S20	DSNUPROC	0004
PH01S21		0004
PH01S22	DSNUPROC	0004
PH01S23		0000
PH01S24	DSNUPROC	0000
PH01S25	DSNUPROC	0000
PH01S26	DSNUPROC	0000
PH01S27	DSNUPROC	0000
PH01S28	DSNUPROC	0000
PH01S29		0000 or 0004
PH01S30		0000
PH01S31	DSNUPROC	0000
PH01S32		0000
PH01S33	DSNUPROC	0000

DB2 issues the following message for every SQL statement, except for the drop synonym and insert statements:

```
DSNT400I SQLCODE = 0, SUCCESSFUL EXECUTION
```

If the synonyms in the DROP SYNONYM statements are not defined, SQL return codes of -204 result. The INSERT statements violate a check constraint on the EMP table. This results in an SQL return code of -545.

## Job DSNTEJ1L

DSNTEJ1L link-edits the DSNTEP2 object deck (DSNTEP2L) to create an executable load module DSNTEP2.

DSNTEJ1L link-edits the DSNTEP4 object deck (DSNTEP4L) to create an executable load module DSNTEP4.

DSNTEJ1L also binds and runs programs DSNTEP2 and DSNTEP4. DSNTEP2 lists the sample database tables and views. DSNTEP2 is a dynamic PL/I program that accepts SQL statements. DSNTEP2 produces a listing of the results of SELECT statements. DSNTEP4 is identical to DSNTEP2, except that it uses multi-row fetch.

Job DSNTEJ1L requires the Language Environment link-edit and run time libraries. DSNTEJ1L does not require the PL/I compiler.

If DSNTEJ1L runs successfully, it produces the return codes that are shown in the table below.

Table 106. DSNTEJ1L return codes

Step	PROCSTEP	Return code
PH01PS01		0000
PH01PS02		0000 or 0004
PH01PS03		0000
PH01PS04		0000 or 0004

You can compare the output from this job with the sample output for DSNTEJ1L, which is found in member DSN8TJ1L in your *prefix.SDSNIVPD* data set.


If you run DSNTEJ1P before DSNTEJ1L, you can expect step PH01PS02 of job DSNTEJ1L to produce a return code of 0004 and the following message:

```
SQLWARNING ON GRANT  COMMAND, EXECUTE FUNCTION
RESULT OF SQL STATEMENT:
  DSNT404I  SQLCODE = 562, WARNING:  A GRANT OF A PRIVILEGE WAS IGNORED
          BECAUSE THE GRANTEE ALREADY HAS THE PRIVILEGE FROM THE GRANTOR
```

If either DSNTEJ1 or DSNTEJ1L fails or abends, ensure that the user that is specified in the JOB statements is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to DB2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups.

Then, correct any other problems. Before rerunning DSNTEJ1, run DSNTEJ0 to drop the sample data. If you rerun DSNTEJ1L, rerun it from the last successful step.

**Related reference:**

 [DSNTEP2 and DSNTEP4 \(DB2 Application programming and SQL\)](#)

## Job DSNTEJ1P

If you have run DSNTEJ1L, you do not need to run DSNTEJ1P because these jobs produce the same results. The major difference is that DSNTEJ1P uses the PL/I compiler and allows you to customize DSNTEP2 and DSNTEP4.

DSNTEJ1P precompiles, compiles, and link-edits PL/I program DSNTEP2. This program then lists the sample database tables and views. It is a dynamic PL/I program that accepts SQL statements. It produces a listing of the results of SELECT statements.

If DSNTEJ1P runs successfully, it produces the return codes that are shown in the table below.

Table 107. DSNTEJ1P return codes

Step	PROCSTEP	Return code
PH01PS01	PPLI	0000
	PC	0000
	PLI	0000
	PLKED	0004
	LKED	0000
PH01PS02		0000 or 0004
PH01PS03	PPLI	0000
	PC	0000
	PLI	0000
	PLKED	0004
	LKED	0000
PH01PS04		0000 or 0004

You can compare the output from this job with the sample output for DSNTEJ1P, which is found in member DSN8TJ1P in your *prefix.SDSNIVPD* data set.


If you run DSNTEJ1L before DSNTEJ1P, you can expect step PH01PS02 of job DSNTEJ1P to produce a return code of 0004 and the following message:

```
SQLWARNING ON GRANT  COMMAND, EXECUTE FUNCTION
RESULT OF SQL STATEMENT:
DSNT404I SQLCODE = 562, WARNING:  A GRANT OF A PRIVILEGE WAS IGNORED
      BECAUSE THE GRANTEE ALREADY HAS THE PRIVILEGE FROM THE GRANTOR
```

If either DSNTEJ1 or DSNTEJ1P fails or abends, ensure that the user that is specified in the JOB statements is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to DB2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups.

Then, correct any other problems. Before rerunning DSNTEJ1, run DSNTEJ0 to drop the sample data. If you rerun DSNTEJ1P, rerun it from the last successful step.

**Related reference:**

 [DSNTEP2 and DSNTEP4 \(DB2 Application programming and SQL\)](#)

## Job DSNTEJ1U

DSNTEJ1U creates a database, table space, and table with Unicode CCSID.

DSNTEJ1U loads data into the table from a data set that contains a full range of characters in an EBCDIC Latin-1 code page, which results in a mix of single and double-byte characters in the Unicode table. It then runs DSNTEP2 to select and display the data in hex format.

If DSNTEJ1U runs successfully, it produces the return codes that are shown in the table below.

Table 108. DSNTEJ1U return codes

Step	PROCSTEP	Return code
PH01US01		0000
PH01US02		0000
PH01US03	DSNUPROC	0000
PH01US04		0000

## Phase 2: Testing the batch environment

Phase 2 of the installation or migration verification process consists of several jobs. Run the jobs to test the program preparation procedures for various languages.

If any of the Phase 2 jobs fail or abend, be sure that the user that is specified in the JOB statements is authorized. Use the name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSN TIP1. Then correct any other problems, and rerun the jobs from the last successful step.

### Job DSNTEJ2A

DSNTEJ2A tests the assembler program preparation procedures.

This job prepares and invokes program DSNTIAUL, which demonstrates the use of dynamic SQL in assembler to unload the data from tables or views. It also generates LOAD utility statements so the data can be loaded into another table. DSNTEJ2A then uses the LOAD utility to put data into copies of the unloaded tables.

If DSNTEJ2C runs successfully, it produces the return codes that are shown in the table below.

Table 109. DSNTEJ2A return codes

Step	PROCSTEP	Return code
PREPUNL	PC	0000
	ASM	0000 or 0004
	LKED	0000 or 0004
BINDUNL		0000
DELETE		0000
CREATE		0000
UNLOAD		0000
EDIT		0000
LOAD	DSNUPROC	0004

You can compare the output from this job with the sample output for DSNTEJ2A found in member DSN8TJ2A in your *prefix*.SDSNIVPD data set.

#### Related reference:

 [DSNTIAUL \(DB2 Application programming and SQL\)](#)



## Job DSNTEJ2C

Job DSNTEJ2C tests the COBOL program preparation procedures. This job runs the phone application.

The phone application processes a table of telephone numbers, executing various types of SELECT statements and producing the corresponding listings. It can also update a phone number.

If DSNTEJ2C runs successfully, it produces the return codes that are shown in the following table.

Table 110. DSNTEJ2C return codes

Step	PROCSTEP	Return code
PH02CS01		0000
PH02CS02	PC	0004
	COB	0000 or 0004
	PLKED <sup>1</sup>	0004
	LKED	0000 or 0004
PH02CS03	PC	0000
	COB	0000 or 0004
	PLKED <sup>1</sup>	0004
	LKED	0000
PH02CS04		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ2C found in member DSN8TJ2C in your *prefix.SDSNIVPD* data set.

**Related concepts:**

COBOL options to use with the installation verification procedures

**Related tasks:**

Working with the phone application scenario

## Job DSNTEJ2D

Job DSNTEJ2D tests the C program preparation procedures.

You must have sequence numbering on to run this job from an ISPF session. The C job runs only the phone application.

If DSNTEJ2D runs successfully, it produces the return codes that are shown in the table below.

Table 111. DSNTE2D return codes

Step	PROCSTEP	Return code
PH02DS01	PC	0004
	C	0000
	PLKED	0000 or 0004
	LKED	0004

Table 111. DSNTE2D return codes (continued)

Step	PROCSTEP	Return code
PH02DS02	PC	0000
	C	0000
	PLKED	0000 or 0004
	LKED	0000 or 0004
PH02DS03		0000

You can compare the output from this job with the sample output for DSNTEJ2D found in member DSN8TJ2D in your *prefix.SDSNIVPD* data set.

**Related concepts:**

Job DSNTEJ2C

## Job DSNTEJ2E

Job DSNTEJ2E tests the C++ program preparation procedures.

You must have sequence numbering on to run this job from an ISPF session. The C++ job runs only the phone application.

If DSNTEJ2E runs successfully, it produces the return codes that are shown in the table below.

Table 112. DSNTE2E return codes

Step	PROCSTEP	Return code
PH02ES01	PC	0004
	C	0000
	PLKED	0000 or 0004
	LKED	0004
PH02ES02	PC	0000
	CP	0000
	PLKED	0000 or 0004
	LKED	0004
PH02ES03	PC	0004
	CP	0000
	PLKED	0000 or 0004
	LKED	0000
PH02ES04		0000

You can compare the output from this job with the sample output for DSNTEJ2E found in member DSN8TJ2E in your *prefix.SDSNIVPD* data set.

**Related concepts:**

Job DSNTEJ2C

## Job DSNTEJ2F

Job DSNTEJ2F tests the Fortran program preparation procedures.

The FORTRAN job runs only the phone application.

If DSNTEJ2F runs successfully, it produces the return codes that are shown in the table below.

Table 113. DSNTE2F return codes

Step	PROCSTEP	Return code
PH02FS01	PC	0004
	ASM	0000
	LKED	0004
PH02FS02	PC	0000
	FORT	0000
	LKED	0000
PH02FS03		0000

You can compare the output from this job with the sample output for DSNTEJ2F found in member DSN8TJ2F in your *prefix*.SDSNIVPD data set.

**Related concepts:**

Job DSNTEJ2C

## Job DSNTEJ2H

Job DSNTEJ2H tests the XML program preparation procedures.

If this job runs successfully, it produces the following return codes:

Table 114. DSNTEJ2H return codes

Step	PROCSTEP	Return code
PH02HS01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02HS02	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02HS03	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02HS04	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02HS05		0000
PH02HS06		0000
PH02HS07		0000
PH02HS08		0000
PH02HS09		0000

## Job DSNTEJ2P

Job DSNTEJ2P tests the PL/I program preparation procedures.

The PL/I job runs the phone application.

If DSNTEJ2P runs successfully, it produces the return codes that are shown in the table below.

Table 115. DSNTEJ2P return codes

Step	PROCSTEP	Return code
PH02PS01		0000
PH02PS02	PPLI	0000
	PC	0004
	PLI	0000
	PLKED	0004
	LKED	0004
PH02PS03	PPLI	0000
	PC	0000
	PLI	0000
	PLKED	0004
	LKED	0000
PH02PS04		0000
PH02PS05		0000

You can compare the output from this job with the sample output for DSNTEJ2P found in member DSN8TJ2P in your *prefix*.SDSNIVPD data set.

## Job DSNTEJ2U

DSNTEJ2U prepares and tests several sample user-defined functions and a driver program that exercises the user-defined functions.

In order for the installation CLIST to generate job DSNTEJ2U, you must complete the following steps during installation:

- Specify that the host has access to C/C++ for z/OS on installation panel DSNTIPU.
- Specify the name of the default WLM environment on installation panel DSNTIPX.

The sample user-defined functions are:

### Function

#### Description

#### ALTDATE

Returns the current date in a user-specified format or converts a user-specified date from one format to another.

#### ALTIME

Returns the current time in a user-specified format or converts a user-specified time from one format to another.

#### CURRENCY

Formats a floating point number as a currency value.

**DAYNAME**

Returns the day of the week for a user-specified date in ISO format.

**MONTHNAME**

Returns the month for a user-specified date in ISO format.

**TABLE\_LOCATION**

Returns the location name of a table, view, or undefined object found after resolving aliases for a user-specified object.

**TABLE\_NAME**

Returns the name of a table, view, or undefined object found after resolving aliases for a user-specified object.

**TABLE\_SCHEMA**

Returns the schema name of a table, view, or undefined object found after resolving aliases for a user-specified object.

**WEATHER**

Returns sample weather data obtained from a TSO data set by way of demonstrating the usefulness of a user-defined function table function.

If you do not have C++ installed, skip steps PH02US08 and PH02US09. Also remove all statements that refer to DAYNAME and MONTHNAME from part DSNTEJ2U in the *prefix.SDSNSAMP* library.

Job DSNTEJ2U consists of the steps that are listed in the table below.

*Table 116. Steps in job DSNTEJ2U*

Step	Function
1	Drops all specific sample user-defined functions.
2	Creates and registers all sample user-defined functions. Grants EXECUTE authority to PUBLIC for the sample user-defined functions.
3-10	Prepares the eight external programs used by specific user-defined functions.
11	Binds the package for the TABLE_NAME, TABLE_SCHEMA, and TABLE_LOCATION functions. These are the only sample functions that issue SQL statements. This step also grants EXECUTE authority on these two samples to PUBLIC.
12	Invokes DSNTEP2 to exercise the sample user-defined functions.
13	Prepares DSN8DUWF, the external module for the sample user defined table function, WEATHER.
14	Prepares DSN8DUWC, a sample client function for statically invoking the WEATHER user-defined table function.
15	Binds the package and plan for DSN8DUWC and grants the necessary authorities.
16	Invokes DSN8DUWC.

If DSNTEJ2U runs successfully, it produces the return codes that are shown in the table below.

*Table 117. DSNTEJ2U return codes*



Step	PROCSTEP	Return code
PH02US01		0000

Table 117. DSNTEJ2U return codes (continued)

Step	PROCSTEP	Return code
PH02US02		0000 or 0004
PH02US03 - PH02US07	PC	0004
	C	0000
	PLKED	0004
	LKED	0000
PH02US08 - PH02US09	PC	0004
	CP	0000
	PLKED	0004
	LKED	0000
PH02US10	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02US11		0000
PH02US12		0004
PH02US13	PC	0004
	C	0000
	PLKED	0004
	LKED	0000
PH02US14	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH02US15		0000 or 0004
PH02US16		0000

You can compare the output from this job with the sample output for DSNTEJ2U found in member DSN8TJ2U in your *prefix*.SDSNIVPD data set.

**Related concepts:**

-  Sample user-defined functions (DB2 SQL)
-  Steps to creating and using a user-defined function (DB2 Application programming and SQL)

**Related reference:**

- DSNTIPU: Data set names panel 2
- DSNTIPX: Routine parameters panel

---

## Phase 3: Testing SPUFI, DRDA access, dynamic SQL, and TSO

Phase 3 of the installation or migration verification process allows you to test SPUFI (SQL Processor Using File Input) and DRDA access. You can also run dynamic SQL statements, run the phone application in TSO, and bind packages at the local and remote locations.

SPUFI is a facility of DB2I. You can only run SPUFI under ISPF. You can run dynamic SQL whether or not you have ISPF.

**Related tasks:**

Testing SPUFI

## Testing SPUFI

During Phase 3 of the installation or migration verification process, you can test SPUFI to ensure that it is working properly.

### Procedure

To test SPUFI:

1. Log on to TSO.
2. Enter ISPF (this might be done for you, depending on your site's standard practice).
3. On the DB2I defaults panel, change the DB2 name to the DB2 subsystem name you entered on panel DSNTIPM during installation. Then select DB2I on the ISPF Primary Option Menu.
4. Select SPUFI on the DB2I menu.
5. Enter the library name '*prefix*.NEW.SDSNSAMP(DSNTESA)' as input to SPUFI on line 1, the DATASET NAME parameter. If your site uses the comma as a decimal point, the library name entered must be for the tailored version of job DSNTESA that was modified by the installation CLIST.
6. Define an output data set name on line 4, the output DATASET NAME parameter of the panel. This allows you to review the output.
7. Press ENTER, and examine the results. These SQL statements require a significant amount of DB2 processing; you could have to wait for the output.
8. Run steps 5, 6, and 7 three times:
  - Once with member DSNTESA, which uses a set of SQL statements to create a short-lived table space and table.
  - Once with member DSNTESC, which creates objects that support EXPLAIN information. If you are migrating from an earlier DB2 version, DSNTESC is customized by the installation CLIST to migrate the Version 8 or Version 9.1 PLAN\_TABLE, DSN\_FUNCTION\_TABLE, DSN\_STATEMNT\_TABLE, and DSN\_STATEMENT\_CACHE\_TABLE to DB2 10 with a schema name of DSN8A10. If your Version 8 or Version 9.1 tables have a different schema name, edit DSNTESC to use your schema name. Migration of these tables from a prior release should not be performed more than once.
  - Once with member DSNTESI, which retrieves the EXPLAIN information.

### What to do next

If any step fails or abends, be sure that the DB2 subsystem name is specified in the NAME field on the DB2I Defaults panel.

If you must drop a Version 8, Version 9.1, or DB2 10 PLAN\_TABLE, remove the appropriate comments from the job to issue the DROP statements.


Also, make sure that the user ID that you are using is authorized. If the name that you specified for either the SYSADM or SYSADM2 subsystem parameter is a primary authorization ID, use this name. If the sample authorization exit and RACF are installed, and both SYSADM and SYSADM2 are known to DB2 as

secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups. Then, correct any other problems and rerun the scenario from the last successful step.

**Related concepts:**

Dynamic SQL statements: DSNTEA, DSNTEQ

**Related tasks:**

 [Creating EXPLAIN tables \(DB2 Performance\)](#)

**Related reference:**

 [EXPLAIN tables \(DB2 Performance\)](#)

## Dynamic SQL and the ISPF/CAF application

The Phase 3 jobs of the installation or migration verification process install the ISPF/CAF sample application. This sample consists of an assembler or COBOL call attachment facility (CAF) interface, a connection manager program, and the phone application. The sample also includes the distributed application that uses DRDA access.

Job DSNTEJ1 prepares the assembler interface, and job DSNTEJ3C prepares the COBOL interface. The connection manager program and the phone application each exist in COBOL and PL/I. Job DSNTEJ3C prepares the COBOL version; job DSNTEJ3P prepares the PL/I version. The distributed application using DRDA access is written in COBOL.

**Related concepts:**

COBOL options to use with the installation verification procedures

## Jobs DSNTEJ3C and DSNTEJ3P

Job DSNTEJ3C prepares a COBOL ISPF/CAF sample application and job DSNTEJ3P prepares a PL/I ISPF/CAF sample application.

To prepare for the distributed sample application, job DSNTEJ3C binds a package at the local (client) and remote (server) subsystems. For concurrent installations at two DB2 locations, designate one location as the client and the other location as the server. Both the client and server subsystems must be running DB2 10. Because DSNTEJ3C does a remote bind, you must set up your client and server systems for remote communication before running this job. The sample jobs DSNTEJ1 and DSNTEJ2C or DSNTEJ2P must have been run on the server subsystem.

PH03CS06, the last job step of DSNTEJ3C, binds the sample organization application at a server DB2 subsystem if the following conditions are met. If these conditions are not met, job step PH03CS06 is removed by the installation CLIST.

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY and it does not match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

If DSNTEJ3C runs successfully, it produces the return codes that are shown in the following table.



Table 118. DSNTJ3C return codes

Step	PROCSTEP	Return code
PH03CS01	PC	0004
	COB	0000 or 0004
	PLKED <sup>1</sup>	0004
	LKED	0000
PH03CS02	PC	0004
	COB	0000 or 0004
	PLKED <sup>1</sup>	0004
	LKED	0000
PH03CS03	PC	0000
	COB	0004
	PLKED <sup>1</sup>	0004
	LKED	0000
PH03CS04	PC	0000 or 0004
	COB	0000 or 0004
	PLKED <sup>1</sup>	0004
	LKED	0000
PH03CS05		0000 or 0004
PH03CS06		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

Step PH03CS06 can give a return code of 0004 if sample job DSNTJ1 was not run on the remote system. For testing, you should run job DSNTJ1 on the remote system.

If job DSNTJ3P runs successfully, it produces the return codes that are shown in the following table.

Table 119. DSNTJ3P return codes

Step	PROCSTEP	Return code
PH03PS01	PPLI	0000
	PC	0004
	PLI	0000
	PLKED	0004
	LKED	0000
PH03PS02	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0000
PH03PS03		0000

**Related tasks:**

Connecting distributed database systems

**Related reference:**

DSNTIPY: Job editing panel

## Job DSNTEJ3M

Job DSNTEJ3M creates, populates, and processes a database that demonstrates the use of DB2 materialized query tables (MQTs).

Before you run job DSNTEJ3M, you must create a PLAN\_TABLE. To create this table, specify the member DSNTEESC as an input data set name to SPUFI.

If DSNTEJ3M runs successfully, it produces the return codes that are shown in the table below.

Table 120. DSNTEJ3M return codes

Step	PROCSTEP	Return code
PH03MS00		0000
PH03MS01		0000
PH03MS02		0000
PH03MS03		0000 or 0004
PH03MS04		0000
PH03MS05		0000
PH03MS06		0000
PH03MS07		0000

## Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

### Procedure

To start an application in a TSO environment:

1. Enter a CALL command for option 6 of the ISPF primary option menu.
2. To start the COBOL phone sample version of the connection manager, enter the following command:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SCM)'
```

3. To start the PL/I phone sample version of the connection manager, enter the following command:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SPM)'
```

After you enter one of these commands, DB2 displays the sample applications panel, which is shown in the following figure.

```

DB2 SAMPLE APPLICATIONS MENU
====>

Select one of the following options and press enter.

 1 COBOL PHONE SAMPLE      (DB2 ISPF COBOL Application)
 2 PL/I PHONE SAMPLE       (DB2 ISPF PL/I Application)
 3 COBOL ORGANIZATION      (DB2 ISPF COBOL Application)

 4 C EMPLOYEE RESUME       (DB2 ISPF C Application)
 5 C EMPLOYEE PHOTO        (DB2 ISPF & GDDM C Application)

 6 COBOL EMPLOYEE RESUME   (DB2 ISPF COBOL Application)
 7 COBOL EMPLOYEE PHOTO    (DB2 ISPF & GDDM COBOL Application)

SPECIFY DB2 SUBSYSTEM NAME ====> DSN

PRESS:  END TO EXIT

```

Figure 81. Initial panel of the ISPF/CAF application

Choosing option 1 or 2 on the sample applications panel during Phase 3 invokes either the COBOL or the PL/I version of the phone application. Choosing option 3 on the sample applications panel during Phase 6 invokes the COBOL organization application, which uses DRDA access to distributed data. Choosing options 4, 5, 6, and 7 on the sample applications panel during Phase 7 invokes the "Employee Resume" and "Employee Photo" applications, which processes LOB data. Options 4 and 5 access the C language sample applications, and options 6 and 7 access the COBOL language sample applications. You must run job DSNTEJ73 before you can access option 4. You must run job DSNTEJ75 before you can access option 5. You must run job DSNTEJ77 before you can access option 6. You must run job DSNTEJ78 before you can access option 7.

**Related tasks:**

- Working with the distributed organization application scenario
- Working with the employee resume and photo scenarios
- Make DB2I panels, messages, and load modules available to ISPF and TSO
- Working with the phone application scenario

---

## Phase 4: Testing the IMS environment

Phase 4 of the installation or migration verification process installs the sample IMS transactions for both COBOL and PL/I.

In the PL/I version, the phone application discussed in Phase 2 is also installed as an online transaction.

**Related tasks:**

- Working with the phone application scenario

### Jobs DSNTEJ4C and DSNTEJ4P

Job DSNTEJ4C is for COBOL; DSNTEJ4P is for PL/I. Both jobs complete the same functions.

Jobs DSNTEJ4C and DSNTEJ4P complete the following tasks:

- Precompile, compile, and link-edit the IMS online applications.
- Bind the IMS online applications.
- Create the message format service (MFS) panels for the online applications.

- Run the required PSBGEN and ACBGEN.

Select the proper job and define the applications and transactions to IMS. Member DSN8FIMS in *prefix.SDSNSAMP* contains information to assist in the definition step.

The verification transactions are single mode, single segment, and nonconversational.

**Recommendation:** Use SSM error option R because the program handles any errors. A resource translation table is not required.

Invoke the transaction by using the FORMAT command. The programs accept several lines of input on the first panel and display the results after you press ENTER.

If DSNTEJ4C runs successfully, it produces the return codes that are shown in the following table.

*Table 121. DSNTEJ4C return codes*

Step	PROCSTEP	Return code
PH04CS01	PC	0004
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0004
PH04CS02	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0004
PH04CS03	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0004
PH04CS04		0000
PH04CS05		0000
PH04CS06	S1	0000
	S2	0004
PH04CS07	S1	0000
	S2	0004
PH04CS08	C	0000
	L	0000
PH04CS09	G	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

For DSNTEJ4C, the warning code that is expected from the precompiler step PH04CS01 is:

```
DB2 SQL PRECOMPILER      MESSAGES
DSNH0531 W   NO SQL STATEMENTS WERE FOUND
```

If DSNTEJ4P runs successfully, it produces the return codes that are shown in the following table.

*Table 122. DSNTEJ4P return codes*

<b>Step</b>	<b>PROCSTEP</b>	<b>Return Code</b>
PH04PS01	PPLI	0000
	PC	0004
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS02	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS03	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS04	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS05	PPLI	0000
	PC	0004
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS06	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS07	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH04PS08		0000
PH04PS09		0000

Table 122. DSNTEJ4P return codes (continued)

Step	PROCSTEP	Return Code
PH04PS10	S1	0000
	S2	0004
PH04PS11	S1	0000
	S2	0004
PH04PS12	S1	0000
	S2	0000 or 0004
PH04PS13	S1	0000
	S2	0000 or 0004
PH04PS14	S1	0000
	S2	0000 or 0004
PH04PS15	S1	0000
	S2	0000 or 0004
PH04PS16	C	0000
	L	0000
PH04PS17	G	0000
PH04PS18	C	0000
	L	0000
PH04PS19	G	0000
PH04PS20	C	0000
	L	0000
PH04PS21	G	0000

For DSNTEJ4P, the warning code expected from the precompiler step PH04PS01 is:

```
DB2 SQL PRECOMPILER    MESSAGES
DSNH0531 W    NO SQL STATEMENTS WERE FOUND
```

If either job DSNTEJ4C or job DSNTEJ4P fails or abends, rerun the jobs from the last successful step.

**Related concepts:**

COBOL options to use with the installation verification procedures

## Starting an application in an IMS environment

After logging on to IMS, you can start the organization application or project application.

### Procedure

To start an application in an IMS environment:

Enter an IMS FORMAT command

The FORMAT commands are:

- /FORMAT DSN8IPGO, which starts the PL/I organization version
- /FORMAT DSN8ICGO, which starts the COBOL organization version.

When you enter either of these two commands, the panel that is shown in the following figure is displayed.

When the following command is entered, the panel that is shown in the figure

```
MAJOR SYSTEM ...: 0      ORGANIZATION
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
```

Figure 82. Organization version of FORMAT command display

below is displayed.

```
/FORMAT DSN8IPFO
```

starts the PL/I projects version.

```
MAJOR SYSTEM ...: P      PROJECTS
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
```

Figure 83. Project version of FORMAT command display

## Using the phone application in IMS

When you use IMS, information is interactively processed.

### Procedure

To begin using the phone application in IMS:

Clear the screen and type in a FORMAT command. The FORMAT command that starts PL/I phone application is:

```
/FORMAT DSN8IPNO
```

When the FORMAT command is entered, the panel that is shown in the following figure is displayed.

```
----- TELEPHONE DIRECTORY -----

      LAST NAME ==>
      FIRST NAME ==>

LAST NAME      : * FOR LIST OF ENTIRE DIRECTORY
                % FOR GENERIC LIST (EX. K% = ALL K - NAMES)
FIRST NAME(OPTIONAL): % FOR GENERIC LIST
```

Figure 84. Starting the phone application

---

## Phase 5: Testing the CICS environment

Phase 5 of the installation or migration verification process tests the CICS environment. Phase 5 installs the sample applications for COBOL and PL/I, and it prepares the CICS SQLCA formatter front-end.

### Job DSNTEJ5A

Job DSNTEJ5A assembles and link-edits DSNTIAC, the CICS SQLCA formatter front-end. DSNTEJ5A also assembles and link-edits the RCT and optionally adds the sample definitions to the CSD.

Use DSNTIAC as an alternative to DSNTIAR when you want CICS services to do storage handling and program loading. If you are using CICS Version 4 or CICS Transaction Server 1.1, you need to modify job DSNTEJ5A to use steps DSN8FRCT and DSN8FRDO. You might need to tailor step DSN8FRDO for your system.

If DSNTEJ5A runs successfully, it produces the return codes that are shown in the table below.

Table 123. DSNTEJ5A return codes

Step	PROCSTEP	Return code
PH05AS01		0000
PH05AS02		0000
PH05AS03		0000

### Jobs DSNTEJ5C and DSNTEJ5P

Job DSNTEJ5C installs the sample application transactions in COBOL and prepares the organization application. Job DSNTEJ5P installs the transactions in PL/I and prepares the organization, project, and phone applications.

Both phase 5 jobs perform the following functions:

- Compile and link-edit the CICS online applications
- Bind the CICS online applications
- Create the BMS maps for the online applications.

Select the proper job, and define transactions, programs, and BMS maps to CICS.

*prefix*=SDSNSAMP members DSN8FPPT, DSN8FPCT, and DSN8FRCT contain the respective PPT, PCT, and RCT entries required for the phase 5 applications. These members help you perform the definition step. Make sure that the subsystem ID (SUBID) in the RCT entry matches your DB2 subsystem ID.

If DSNTEJ5C runs successfully, it produces the return codes that are shown in the following table.

Table 124. DSNTEJ5C return codes

Step	PROCSTEP	Return code
MAPG	ASSEM	0000
MAPD	ASSEM	0000
DSNH		0000 or 0004
BIND		0000



Table 124. DSNTEJ5C return codes (continued)

Step	PROCSTEP	Return code
MAPGP	ASSEM	0000
MAPGL		0000
MAPDP	ASSEM	0000
MAPDL		0000

If DSNTEJ5C fails or abends, rerun the job from the last successful step. To receive more prepare-time detail from DSNTEJ5C, change the parameters TERM(LEAVE) and PRINT(LEAVE) to TERM(TERM) and PRINT(TERM).

If DSNTEJ5P runs successfully, it produces the return codes that are shown in the following table.

Table 125. DSNTEJ5P return codes

Step	PROCSTEP	Return code
PH05PS01	ASSEM	0000
PH05PS02	ASSEM	0000
PH05PS03	ASSEM	0000
PH05PS04	ASSEM	0000
PH05PS05	ASSEM	0000
PH05PS06		0004
PH05PS07	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS08		0004
PH05PS09	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS10		0004
PH05PS11	PPLI	0004
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS12		0004
PH05PS13	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS14	ASSEM	0000

Table 125. DSNTEJ5P return codes (continued)

Step	PROCSTEP	Return code
PH05PS15	ASSEM	0000
PH05PS16		0004
PH05PS17	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS18		0004
PH05PS19	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS20		0004
PH05PS21	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0004
PH05PS22		0000 or 0004
PH05PS23		0000
PH05PS24	ASSEM	0000
PH05PH25		0000
PH05PS26	ASSEM	0000
PH05PH27		0000
PH05PS28	ASSEM	0000
PH05PH29		0000
PH05PS30	ASSEM	0000
PH05PH31		0000
PH05PS32	ASSEM	0000
PH05PH33		0000
PH05PS34	ASSEM	0000
PH05PH35		0000
PH05PS36	ASSEM	0000
PH05PH37		0000

If DSNTEJ5P fails or abends, rerun the job from the last successful step. You might find it convenient to break up DSNTEJ5P and run only the unsuccessful steps.

**Related concepts:**

COBOL options to use with the installation verification procedures

**Related reference:**

## Starting an application in a CICS environment

After logging on to CICS, you can start an organization application or project application in the CICS environment.

### Procedure

To start an application in a CICS environment:

Enter a CICS transaction code.  
The CICS transaction codes are:

- D8PP, which starts the PL/I project version
- D8PS, which starts the PL/I organization version
- D8CS, which starts the COBOL organization version.

When these transaction codes are entered, the panels that are shown in the following two figures are displayed.

```
                ACTION SELECTION
MAJOR SYSTEM ...: 0          ORGANIZATION
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
SELECT AN ACTION FROM FOLLOWING LIST

A   ADD (INSERT)
D   DISPLAY (SHOW)
E   ERASE (REMOVE)
U   UPDATE (CHANGE)
```

Figure 85. Initial panel for the organization application in CICS

```
                ACTION SELECTION
MAJOR SYSTEM ...: P          PROJECTS
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
SELECT AN ACTION FROM FOLLOWING LIST

A   ADD (INSERT)
D   DISPLAY (SHOW)
E   ERASE (REMOVE)
U   UPDATE (CHANGE)
```

Figure 86. Initial panel for the project application in CICS

### Related concepts:

The sample application panels

## Using the phone application in CICS

When you use CICS, information is interactively processed.

## Procedure

To begin using the phone application in CICS:

Clear the screen and type in the transaction code:

D8PT

You can change the transaction codes when you install DB2. Check with your system administrator to find out if they have been changed from those shown.

## Using CICS storage-handling facilities

You can use the CICS storage-handling facilities when you run the CICS sample applications.

### Procedure

To use the CICS storage-handling facilities when running the CICS sample applications:

1. Change your DSNTIAR calls to DSNTIAC calls in DSN8MCxx and DSN8MPxx. The calls should look like this:  
`CALL DSNTIAC(EIB,COMMAREA,SQLCA,MSG,LRECL)`
2. Define DSNTIAC and DSNTIA1 in the CSD.
3. Rerun job DSNTEJ5C or job DSNTEJ5P.

---

## Phase 6: Accessing data at a remote site

You can use phase 6 of the DB2 installation or migration verification process to verify that the features of DRDA access are working correctly, to prepare and call sample stored procedures, and to prepare and execute sample callers of certain DB2-supplied stored procedures.

During this optional phase, you test accessing data at a remote site by using the DRDA access application (job DSNTEJ6 in conjunction with job DSNTEJ3C).

You can use the following jobs to test creating and calling stored procedures at either the local site or a remote site.

### **DSNTEJ6S and DSNTEJ6P**

Tests the stored procedure without result set sample

### **DSNTEJ6T and DSNTEJ6D**

Tests the stored procedure with result set sample

### **DSNTEJ61 and DSNTEJ62**

Tests the stored procedure for IMS Open Database Access

### **DSNTEJ63 and DSNTEJ64**

Tests the external SQL procedure batch sample

### **DSNTEJ65**

Tests the external SQL procedures processor invocation sample

### **DSNTEJ66**

Tests the stored procedure that prepares a sample native SQL procedure and caller

You can use the following jobs to test calling DB2-supplied stored procedures at the local site:

**DSNTEJ6U, DSNTEJ6R, and DSNTEJ6V**

Tests the stored procedure for invoking utilities

**DSNTEJ6W**

Tests the stored procedure for invoking WLM\_REFRESH

**DSNTEJ6Z**

Tests the stored procedure for formatting the IFCID 106 trace record to obtain current DB2 configuration settings

## ISPF panel requirements

The installation CLIST prepares samples DSNTEJ6, DSNTEJ6S, DSNTEJ6P, DSNTEJ6T, DSNTEJ6D, DSNTEJ6Z, DSNTEJ61, DSNTEJ62, DSNTEJ63, DSNTEJ64, DSNTEJ65 and DSNTEJ66 only if you specify COMMAND or AUTO in the DDF STARTUP OPTION field of panel DSNTIPR. If you specify NO, the installation CLIST does not prepare these samples. In this case, you should not try to run these samples.

The installation CLIST prepares the stored procedures samples only if you specify a sample WLM environment name in the WLM ENVIRONMENT field on panel DSNTIPX. If you replace the default value with blanks in the WLM ENVIRONMENT field, you cannot start the sample WLM-established stored procedures address space until you update the subsystem parameter.

The installation CLIST tailors the phase 6 sample jobs according to the information that you specify in the REMOTE LOCATION field of panel DSNTIPY. The guidelines for this field are:

- If the field is blank, the installation CLIST only customizes phase 6 sample jobs DSNTEJ63, DSNTEJ64, DSNTEJ65, DSNTEJ66, DSNTEJ6R, DSNTEJ6U, DSNTEJ6V, DSNTEJ6W, and DSNTEJ6Z. Jobs DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66 use the local location name when the REMOTE LOCATION field is blank. Jobs DSNTEJ6R, DSNTEJ6U, DSNTEJ6V, DSNTEJ6W, and DSNTEJ6Z do not use a remote location name.
- If the value in the field is the same as the location name for the DB2 subsystem that you are installing (DB2 LOCATION NAME field of panel DSNTIPR), the stored procedures samples are prepared and customized for local use. However, the DRDA access sample is not prepared, including job DSNTEJ6 and the DRDA access component of job DSNTEJ3C.
- If the value in the field is different from the DB2 LOCATION NAME field, the installation CLIST prepares the phase 6 samples assuming that the remote location is the server and that the local system is the client.

The following table summarizes the ISPF panel values that are required for the installation CLIST to prepare the phase 6 sample jobs.

Table 126. IVP phase 6 job requirements. The installation CLIST only customizes the phase 6 sample jobs if certain fields on the ISPF panels meet requirements.

Job name	Requires COMMAND or AUTO in the DDF STARTUP OPTION field of panel DSNTIPR?	Requires a name in the REMOTE LOCATION field of panel DSNTIPY?	Requires a name in the WLM ENVIRONMENT field of panel DSNTIPX?
DSNTEJ6	Yes	Yes	No
DSNTEJ6S	Yes	Yes	Yes
DSNTEJ6P	Yes	Yes	Yes
DSNTEJ6T	Yes	Yes	Yes
DSNTEJ6D	Yes	Yes	Yes
DSNTEJ6R	No	No	Yes
DSNTEJ6U	No	No	No
DSNTEJ6V	No	No	No
DSNTEJ6W	No	No	Yes
DSNTEJ6Z	Yes	No	Yes
DSNTEJ61	Yes	Yes	Yes
DSNTEJ62	Yes	Yes	Yes
DSNTEJ63	Yes	No	Yes
DSNTEJ64	Yes	No	Yes
DSNTEJ65	Yes	No	Yes
DSNTEJ66	Yes	No	Yes

## Testing multiple subsystems

If you are installing and testing two DB2 subsystems concurrently, you must designate one as the server and the other as the client. If you change these designations during your testing, your results will be unpredictable. Verify that your VTAM APPL statement has the parameter SYNCLVL=SYNCPT defined. This setting allows updates at several locations.

## DRDA access sample

The distributed sample application that uses DRDA access is executed as part of Phase 6 of the installation or migration verification process.

The application is prepared in Phase 3 as part of DSNTEJ3C. Before this application can be run correctly as a DRDA access sample, you must run job DSNTEJ6 at both the local and remote sites to tailor the DEPT sample table for use in a distributed environment.

To set up your samples testing for concurrent installations at two DB2 locations, follow these guidelines:

- Designate one location as the requester (the client) and the other location as the server.
- Run the client version of DSNTEJ6 at the client site only; do **not** run the client version of DSNTEJ6 at the server.

- Edit the server version of DSNTEJ6 at the remote server site; do **not** run the server version of DSNTEJ6 at the client.
- 

**GUIP**

Locate the following text in the server version of DSNTEJ6 within step PH06S01:

```
UPDATE DEPT SET LOCATION = (your remote location name) WHERE DEPTNO = 'F22';
UPDATE DEPT SET LOCATION = (your location name) WHERE LOCATION = ' ';
```

This text should be replaced with:

```
UPDATE DEPT SET LOCATION = (your location name) WHERE DEPTNO = 'F22';
UPDATE DEPT SET LOCATION = (your remote location name) WHERE LOCATION = ' ';
```

**GUIP**

## Job DSNTEJ6

Job DSNTEJ6 consists of a single step that updates the location column in the sample DEPT table at the client and server DB2 subsystems.

The employees in department F22 are recorded as working at the server location that was entered in the REMOTE LOCATION field of panel DSNTIPY. All other employees are recorded as working at the client location.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY and it does not match the name specified in the DB2 LOCATION NAME field of panel DSNTIPR

Before you run DSNTEJ6, ensure that the server DB2 subsystem's DSNTEJ1 job has been run on the server DB2 subsystem. Run the client DB2 subsystem's DSNTEJ6 job only on the server DB2 subsystem.

If DSNTEJ6 runs successfully, it produces the return code that is shown in the table below.

Table 127. DSNTEJ6 return codes

Step	PROCSTEP	Return code
PH06S01		0000

**Related tasks:**

Starting an application in an ISPF/TSO environment in phase 6

**Related reference:**

DSNTIPR: Distributed data facility panel 1

DSNTIPY: Job editing panel

## Starting an application in an ISPF/TSO environment in phase 6

You must have access to ISPF load module libraries in order to run the ISPF/CAF sample application.

## Procedure

To start the sample application:

1. Enter a CALL command from option 6 of the ISPF primary option menu.
2. To start the COBOL sample version of the connection manager, enter the following:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SCM)'
```

After you enter this command, DB2 displays the sample applications panel. Choosing option 3 on the sample applications panel during Phase 6 invokes the COBOL organization application, which uses DRDA access for distributed data.

### Related tasks:

Working with the distributed organization application scenario

Starting an application in an ISPF/TSO environment in phase 6

Make DB2I panels, messages, and load modules available to ISPF and TSO

## Stored procedure samples

DB2 provides a set of stored procedure sample applications. These sample applications demonstrate different ways that a stored procedure can be used by a client to issue DB2 commands to a DB2 server.

Most of these applications prepare and run two programs. One program prepares a stored procedure, and one program executes a client program that calls the stored procedure and returns some response.

DB2 provides the following stored procedure samples:

- A sample stored procedure without a result set
- A sample stored procedure with a result set
- Samples that invoke the following utilities stored procedures:
  - DSNUTILS
  - DSNUTILU
- A sample that invokes the stored procedure WLM\_REFRESH, which refreshes the WLM environment
- A sample that invokes the stored procedure DSNWZP, which lists the settings of subsystem parameters
- A sample stored procedure that uses IMS Open Database Access (ODBA) support
- Two samples of external SQL procedures

All of these samples are part of the installation verification samples, which are located in *prefix.NEW.SDSNSAMP*. The installation CLIST tailored and loaded these jobs during your installation or migration to new-function mode.

To edit any of these sample jobs, specify the appropriate fields on the installation panels. Using the installation panels is the only method that you can use to edit these jobs.

Before you run the sample stored procedures, ensure that you have completed one of the following tasks:

- Configure DB2 for running stored procedures and user-defined functions during installation



- Configure DB2 for running stored procedures and user-defined functions during migration

**Related concepts:**

Installation verification phases and programs

**Stored procedure sample without result set**

DB2 provides a sample stored procedure that uses the instrumentation facility interface (IFI) to issue DB2 commands. The sample stored procedure also returns the responses to the calling program in a parameter.

This sample application consists of two jobs: DSNTEJ6S and DSNTEJ6P. These jobs are part of the installation verification samples, which are located in *prefix.NEW.SDSNSAMP*. The installation CLIST tailored and loaded these jobs during your installation or migration to new-function mode.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTEJ6S before job DSNTEJ6P.
- Ensure that the PL/I product is installed on your client and server systems.
- Ensure that Language Environment is installed.

This application prepares and runs the following programs:

- A stored procedure that uses the IFI to issue DB2 commands.
- A client program that receives DB2 command text and calls the stored procedure to issue the commands. When the program receives the responses from the stored procedure in a parameter that is passed back, it prints the results.

For concurrent installations at two DB2 locations, perform the following actions:

- Run the server version of DSNTEJ6S on the server system only; do **not** run the client version of DSNTEJ6S on the server.
- Run the client version of DSNTEJ6P on the client system only; do **not** run the server version of DSNTEJ6P on the client.

**Job DSNTEJ6S:**

Job DSNTEJ6S compiles and link-edits the sample stored procedure DSN8EP2. DSNTEJ6S also updates the SYSIBM.SYSROUTINES catalog table with information about the stored procedure.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

If you have SQL statements in your stored procedure, you must remove the comment character in the JCL from the step that binds the stored procedure package.

You must run job DSNTEJ6S on the server DB2 subsystem.

If DSNTEJ6S runs successfully, it produces the return codes that are shown in the table below.

*Table 128. DSNTEJ6S return codes*

Step	PROCSTEP	Return code
PH06SS01		0000
PH06SS02		0000
PH06SS03		
	PPLI	0000
	PC	0004
	PLI	0004
	PLKED	0004
	LKED	0000

If SQLCODE -592 is received during the execution of DSNTEJ6T, ensure that SPA is active.

### **Job DSNTEJ6P:**

Job DSNTEJ6P compiles, link-edits, binds, and runs a sample program, DSN8EP1, which calls the sample stored procedure that is created by job DSNTIJ6S.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local DB2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before you run DSNTEJ6P, ensure that DSNTEJ6S has been run on the server DB2 subsystem to create the sample stored procedure.

If DSNTEJ6P runs successfully, it produces the following return codes.

*Table 129. DSNTEJ6P return codes*

Step	PROCSTEP	Return code
PH06PS01		
	PPLI	0000
	PC	0000
	PLI	0004
	PLKED	0004
	LKED	0000
PH06PS02		0004
PH06PS03		0000

Output from a successful execution of DSNTEJ6P lists each DB2 command that was executed, followed by the messages that were generated by the DB2 command processor.

You can compare the output from this job with the sample output for DSNTEJ6P, which is in member DSN8TJ6P of your *prefix.SDSNIVPD* data set.

### Stored procedure sample with result set

DB2 provides a sample stored procedure that uses the instrumentation facility interface (IFI) to issue DB2 commands. The sample stored procedure also returns the responses to the calling program in a result set.

This sample application consists of two jobs: DSNTEJ6T and DSNTEJ6D. These jobs are part of the installation verification samples, which are located in *prefix.NEW.SDSNSAMP*. The installation CLIST tailored and loaded these jobs during your installation or migration to new-function mode.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTEJ6T before job DSNTEJ6D.
- Ensure that C for z/OS is installed.
- Ensure that Language Environment is installed.

This application prepares and runs the following programs:

- A stored procedure that uses the IFI to issue DB2 commands.
- A client program that receives DB2 command text and calls the stored procedure to issue the commands. When the program receives the responses from the stored procedure in a result set, it prints the results.

For concurrent installations at two DB2 locations, perform the following actions:

- Run the server version of job DSNTEJ6T on the server side only; do **not** run it on the client side.
- Run the client version of job DSNTEJ6D on the client side only; do **not** run it on the server side.

### Job DSNTEJ6T:

Job DSNTEJ6T registers, prepares, and binds the sample stored procedure DSN8ED2 on the server. DSNTEJ6T also defines a created temporary table to receive the IFI output that is returned as a result set.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

You must run job DSNTEJ6T on the server DB2 subsystem.

If DSNTEJ6T runs successfully, it produces the return codes that are shown in the table below.

Table 130. *DSNTEJ6T* return codes

Step	PROCSTEP	Return code
PH06TS01		0000
PH06TS02		0000
PH06TS03	PC	0004
	C	0000
	PLKED	0004
	LKED	0000
PH06TS04		0000 or 0004

If SQLCODE -592 is received during the execution of DSNTEJ6T, ensure that SPA is active.

### Job DSNTEJ6D:

Job DSNTEJ6D compiles, link-edits, binds, and runs sample program DSN8ED1, which calls the sample stored procedure that is created by job DSNTEJ6T.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local DB2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before you run DSNTEJ6D, ensure that DSNTEJ6T has been run on the server DB2 subsystem to create the sample stored procedure.

If DSNTEJ6D runs successfully, it produces the return codes that are shown in the table below.

Table 131. *DSNTEJ6D* return codes

Step	PROCSTEP	Return code
PH06DS01	PC	0000
	C	0000 or 0004
	PLKED	0000 or 0004
	LKED	0000
PH06DS02		0004
PH06DS03		0000

Output from a successful execution of DSNTEJ6D lists each DB2 command that was executed, followed by the messages that were generated by the DB2 command processor.

You can compare the output from this job with the sample output for DSNTEJ6D, which is in member DSN8TJ6D of your *prefix*.SDSNIVPD data set.

### Sample callers of utilities stored procedures

You can use the DB2-supplied utilities stored procedures to run DB2 utilities from DB2 application programs by using the SQL CALL statement.

The following utilities stored procedures are supplied with DB2:

- DSNUTILS (deprecated)
- DSNUTILU

When called, the utilities stored procedures perform the following actions:

1. Dynamically allocates the specified data sets
2. Creates the utility input stream (SYSIN)
3. Invokes DB2 utilities (DSNUTILB)
4. Deletes all rows currently in the created temporary table (SYSIBM.SYSPRINT)
5. Captures the utility output stream (SYSPRINT)
6. Puts the output into the created temporary table (SYSIBM.SYSPRINT)

The utilities stored procedures must run as a WLM-managed stored procedure.

#### Related reference:

[DSNUTILS stored procedure \(deprecated\) \(DB2 SQL\)](#)

[DSNUTILU stored procedure \(DB2 SQL\)](#)

#### Job DSNTEJ6U:

Job DSNTEJ6U compiles, link-edits, binds, and runs sample PL/I program DSN8EPU, which invokes the DSNUTILS stored procedure to execute a utility.

Job DSNTEJ6U uses the local DB2 subsystem as both the client and the server subsystem.

The installation CLIST always edits this job.

Before running job DSNTEJ6U, ensure that DSNUTILS has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILS.

If DSNTEJ6U completes successfully, it produces the return codes that are shown in the table below.

Table 132. DSNTEJ6U return codes

Step	PROCSTEP	Return code
PH06US01	PPLI	0000
	PC	0000
	PLI	0000
	PLKED	0004
	LKED	0000

Table 132. DSNTEJ6U return codes (continued)

Step	PROCSTEP	Return code
PH06US02		0000
PH06US03		0000

Output from a successful execution of DSNTEJ6U lists the parameters specified followed by the messages generated by the DB2 DIAGNOSE DISPLAY MEPL utility.


You can compare the output from this job with the sample output for DSNTEJ6U found in member DSN8TJ6U in your *prefix*.SDSNIVPD data set.

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Related reference:**

 DSNUTILS stored procedure (deprecated) (DB2 SQL)

**Job DSNTEJ6R:**

Job DSNTEJ6R compiles, link-edits, binds, and runs sample C program DSN8ED8, which invokes the DSNUTILU stored procedure to execute a utility.

For convenience on TSO, the utility control statement that is input to DSN8ED8 is encoded in EBCDIC and converted to Unicode before being passed to DSNUTILU.

Job DSNTEJ6R uses the local DB2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if you specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ6R, ensure that DSNUTILU has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILU.

If DSNTEJ6R completes successfully, it produces the return codes that are shown in the table below.

Table 133. DSNTEJ6R return codes

Step	PROCSTEP	Return code
PH06RS00		0000
PH06RS01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH06RS02		0000 or 0004
PH06RS03		0000

Output from a successful execution of DSNTEJ6R lists the parameters specified followed by the messages generated by the DB2 DIAGNOSE DISPLAY MEPL utility.

You can compare the output from this job with the sample output for DSNTEJ6U found in member DSN8TJ6U in your *prefix*.SDSNIVPD data set.

**Related concepts:**

 Utility control statements (DB2 Utilities)

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Related reference:**

 DSNUTILU stored procedure (DB2 SQL)

**Job DSNTEJ6V:**

Job DSNTEJ6V compiles, link-edits, binds, and runs sample C++ program DSN8EE1, which invokes the DSNUTILS stored procedure to execute a utility.

Job DSNTEJ6V uses the local DB2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if the following conditions are met:

- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You indicated on panel DSNTIPU that an IBM C++ compiler is installed.

Before running job DSNTEJ6V, ensure that DSNUTILS has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILS.

If DSNTEJ6V completes successfully, it produces the return codes that are shown in the table below.

*Table 134. DSNTEJ6V return codes*

Step	PROCSTEP	Return code
PH06VS01	PC	0004
	CP	0000
	PLKED	0004
	LKED	0004
PH06VS02	PC1	0000
	CP1	0000
	PC2	0004
	CP2	0000
	PLKED	0004
PH06VS03	LKED	0000
		0000 or 0004
PH06VS04		0000

A successful execution of DSNTEJ6V unloads rows and columns from the PROJ sample table.


You can compare the output from this job with the sample output for DSNTEJ6V found in member DSN8TJ6V in your *prefix*.SDSNIVPD data set.

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Related reference:**

 DSNUTILS stored procedure (deprecated) (DB2 SQL)

**Job DSNTEJ6W**

Job DSNTEJ6W is a JCL job that creates and initializes a sample SAF resource profile. DSNTEJ6W also prepares, binds, and executes DSN8ED6.

DSN8ED6 is a C language caller of the WLM\_REFRESH stored procedure. It accepts the WLM environment name and, optionally, the subsystem ID and an SQLID to be in effect when WLM\_REFRESH is invoked.

If a name is specified in the WLM ENVIRONMENT field on installation panel DSNTIPX, the installation CLIST customizes DSNTEJ6W to run in and recycle that WLM environment.

DSNTEJ6W also includes commented-out job steps that show:

- How to prepare the DSNTWR external module from the DSNTWRS sample source code.
- How to prepare the DSNTWRE module from the DSNTWRE sample source code. DSNTWRE is used by DSNTWR.

Do not uncomment and run these jobs unless you maintain a customized copy of DSNTWRS or DSNTWRE. If you do not customize the source code, use the DB2-supplied DSNTWR and DSNTWRE modules in the *prefix*.SDSNLOAD library and the package that is bound by installation job DSNTIJRT.

Job DSNTEJ6W uses the local DB2 subsystem as both the client and the server subsystem.

Before running job DSNTEJ6W, ensure that WLM\_REFRESH has been created as part of the installation or migration process. If you are not authorized to create special resource profiles, have your system security administrator perform the first step of this job. The SQLID that is used to run DSNTEJ6W needs READ access to this profile.

If DSNTEJ6W completes successfully, it produces the return codes that are shown in the table below.

*Table 135. DSNTEJ6W return codes*

Step	PROCSTEP	Return code
PH06WS00 <sup>1</sup>	PC	0004
	ASM	0000
	LKED	0000



Table 135. DSNTEJ6W return codes (continued)

Step	PROCSTEP	Return code
PH06WS01 <sup>1</sup>	PC	0000
	ASM	0000
	LKED	0000
PH06WS02 <sup>1</sup>		0000
PH06WS03	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH06WS04		0000 or 0004
PH06WS05		0000 or 0004

**Notes:**

1. Return codes for PH06WS00, PH06WS01 and PH06WS02 are generated only if the job steps are uncommented.

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Related reference:**

 WLM\_REFRESH stored procedure (DB2 SQL)

**Job DSNTEJ6Z**

Job DSNTEJ6Z generates a report of current subsystem parameter settings. This report is generated by DSN8ED7, a C-language caller of stored procedure DSNWZP. You must have MONITOR1 privileges to run DSNWZP.

Job DSNTEJ6Z uses the local DB2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ6Z, ensure that DSNWZP has been created as part of the installation or migration process.

If DSNTEJ6Z completes successfully, it produces the return codes that are shown in the table below.

Table 136. DSNTEJ6Z return codes

Step	PROCSTEP	Return code
PH06ZS01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000

Table 136. DSNTEJ6Z return codes (continued)

Step	PROCSTEP	Return code
PH06ZS02		0000 or 0004
PH06ZS03		0000

A successful execution of DSNTEJ6Z provides a report as shown in the figure below.

```

DSN8ED7: Sample DB2 Configuration Setting Report Generator

Macro   Parameter  Current   Description/   Install   Fld
Name    Name        Setting   Install Field Name  Panel ID  No.
-----
DSN6SYSP AUDITST   0000000000  AUDIT TRACE     DSNTIPN   1
DSN6SYSP CONDBAT 0000010000  MAX REMOTE CONNECTED DSNTIPE   4
DSN6SYSP CTHREAD 00200      MAX USERS      DSNTIPE   2
DSN6SYSP PCLOSEN 00010      RO SWITCH CHKPTS DSNTIPL1  8
...

```

Figure 87. DSNTEJ6Z report format

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Sample ODBA stored procedure**


IMS Open Database Access (ODBA) support enables a DB2 stored procedure to directly connect to an IMS DBCTL system and issue DL/I calls to access IMS databases.


This sample ODBA stored procedure application consists of two jobs: DSNTEJ61 and DSNTEJ62. These jobs are part of the installation verification samples, which are located in *prefix*.NEW.SDSNSAMP. The installation CLIST tailored and loaded these jobs during your installation or migration to new-function mode.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTEJ61 before DSNTEJ62.
- Ensure that Enterprise COBOL for z/OS is installed.
- Ensure that Language Environment is installed.
- Start a WLM-established stored procedure address space to run DSNTEJ61 and DSNTEJ62. You need to update the startup procedure for the WLM-established stored procedure address space to add the ODBA data set names to the STEPLIB and DFSRESLB concatenations. An example of a data set name for ODBA is IMSVS.RESLIB.

**Related tasks:**

 Assigning stored procedures and functions to WLM application environments (DB2 Performance)

 Writing an external procedure to access IMS databases (DB2 Application programming and SQL)

## Job DSNTEJ61:

Job DSNTEJ61 prepares sample stored procedure DSN8EC1, which uses ODBA. DSN8EC1 can add, update, delete, and display telephone directory records from the IMS sample database, DFSIVD1. DSN8EC1 shows how the AERTDLI API is used to issue IMS DL/I calls.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before running job DSNTEJ61, read the dependencies information of the job prolog to verify that the server site is correctly configured and has a connection to an IMS subsystem.

If DSNTEJ61 runs successfully, it produces the return codes that are shown in the table below.

*Table 137. DSNTEJ61 return codes*

Step	PROCSTEP	Return code
PH061S01		0000
PH061S02		0000
PH061S03	PC	0004
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

## Related concepts:

Job DSNTEJ62

## Job DSNTEJ62:

Job DSNTEJ62 prepares and invokes the sample client program DSN8EC2, which calls stored procedure DSN8EC1 multiple times to add, delete, and display telephone directory records. DSN8EC1 is created by job DSNTEJ61.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local DB2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before running DSNTEJ62, complete the manual editing that is described in the dependencies information in the job prolog.

If DSNTEJ62 runs successfully, it produces the return codes that are shown in the table below.

*Table 138. DSNTEJ62 return codes*

Step	PROCSTEP	Return code
PH062S01	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000
PH062S02		0000 or 0004
PH062S03		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related concepts:**

Job DSNTEJ61

**Sample SQL procedures**

DB2 for z/OS provides applications for external SQL procedures and native SQL procedures.


The applications for external SQL procedures are:

- DSNTEJ63
- DSNTEJ64
- DSNTEJ65

C and Language Environment are required for jobs DSNTEJ63, DSNTEJ64, and DSNTEJ65.

The application for native SQL procedures is DSNTEJ66.

**Related tasks:**

 Assigning stored procedures and functions to WLM application environments (DB2 Performance)

**Job DSNTEJ63:**

Job DSNTEJ63 prepares the sample external SQL procedure, DSN8ES1, which accepts a department number and returns salary and bonus data.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

If a remote location was specified in the REMOTE LOCATION field of panel DSNTIPY, job DSNTEJ63 should be run on the remote server subsystem.

Before running DSNTEJ63, you should manually edit the job as described in the dependencies information in the job prolog.

If DSNTEJ63 runs successfully, it produces the return codes that are shown in the following table.

Table 139. DSNTEJ63 return codes

Step	PROCSTEP	Return code
PH063S01		0000
PH063S02	PC	0004
	PCC	0004
	C	0000
	PLKED	0004
	LKED	0000
PH063S03		0000 or 0004

#### Job DSNTEJ64:

Job DSNTEJ64 prepares and executes DSN8ED3, which is a sample routine that calls the sample external SQL procedure, DSN8ES1. DSN8ES1 was created by job DSNTIJ63.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local DB2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ64, ensure that job DSNTEJ6S was run on the server subsystem. Also run job DSNTEJ63 before running job DSNTEJ64. Before running DSNTEJ64, you should manually edit the job as described in the dependencies information in the job prolog.

If DSNTEJ64 runs successfully, it produces the return codes that are shown in the following table.

Table 140. DSNTJ64 return codes

Step	PROCSTEP	Return code
PH064S01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH064S02		0000 or 0004
PH064S03		0000

You can compare the output from this job to the sample output for DSNTJ64, which is found in member DSN8TJ64 in data set named *prefix.SDSNIVPD*.

### Job DSNTJ65:

| Job DSNTJ65 prepares and runs a sample application that calls the  
 | SYSPROC.DSNTPSMP stored procedure processor to create a sample external SQL  
 | procedure. The sample external SQL procedure is created at the location that is  
 | specified in the REMOTE LOCATION field of panel DSNTIPY.

| Job DSNTJ65 then prepares and runs a sample application that calls the external  
 | SQL procedure. The sample caller first connects to the location that is specified in  
 | the REMOTE LOCATION field of panel DSNTIPY.

| If a remote location is specified in the REMOTE LOCATION field name on  
 | installation panel DSNTIPY, ensure that both DB2 REXX language support and the  
 | DSNTPSMP stored procedure are available at that location. If the remote location  
 | name is the same as the name that is specified in the DB2 LOCATION NAME field  
 | of panel DSNTIPR, the local DB2 subsystem is used as both the client and server.

The major components of job DSNTJ65 are as follows:

- DSNWLM\_REXX is the WLM core environment for DSNTPSMP.
- DSN8ED4 is a sample C program that calls the DB2 external SQL procedures processor.
- DSN8ES2 is a sample external SQL procedure that calculates employee bonuses.
- DSN8ED5 is a sample C program that calls the external SQL procedure DSN8ES2.

| The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

| Before running job DSNTJ65, ensure that DSNTPSMP has been created as part of  
 | the installation or migration process.

**Recommendation:** DSNTPSMP requires that the default EBCDIC CCSID that is used by DB2 also be compatible with the C compiler. Do not run DSNTJ65 if the

default EBCDIC CCSID for DB2 is not compatible with the C compiler. Using an incompatible CCSID results in compile-time errors. Examples of incompatible CCSIDs include 290, 930, 1026, and 1155.

If DSNTEJ65 runs successfully, it produces the return codes that are shown in the following table.

*Table 141. DSNTEJ65 return codes*

Step	PROCSTEP	Return code
PH065S01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH065S02		0000 or 0004
PH065S03		0000 or 0004
PH065S04		0000 or 0004
PH065S05	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH065S06		0000 or 0004
PH065S07		0000

You can compare the output from this job to the sample output for DSNTEJ65, which is found in member DSN8TJ65 in the data set named *prefix.SDSNIVPD*.

**Related tasks:**

Installation step 20: Set up DB2-supplied routines

Migration step 26: Set up DB2-supplied routines

**Job DSNTEJ66:**

Job DSNTEJ66 creates a sample native SQL procedure. It also prepares and executes a sample caller of that SQL procedure on the local DB2 subsystem. It then modifies the SQL procedure slightly, activates the change on the local subsystem, and executes the sample caller to call the updated SQL procedure.

Specifically, job DSNTEJ66 completes the following actions:

- Creates a sample native SQL procedure called DSN8.DSN8ES3 that generates and returns a CREATE PROCEDURE statement for a given stored procedure.
- Prepares and executes a sample caller of DSN8ES3 called DSN8ED9.
- Illustrates how to use ALTER PROCEDURE... ADD VERSION to create a version V2 of DSN8ES3 that does the same thing as the original version but also adds a terminating semicolon at the end of the generated CREATE PROCEDURE statement.
- Illustrates how to use ALTER ACTIVATE to make version V2 the active version of DSN8ES3.
- If you specify a remote DB2 subsystem in the REMOTE LOCATION field and it does not match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, additional job steps do the following:
  - Deploys the sample native SQL procedure on the remote DB2 subsystem.

- Binds the sample caller on the remote DB2 subsystem and execute it to call the native SQL procedure at that site.

If the REMOTE LOCATION field is blank or matches the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the deploy-related steps are removed from DSNTTEJ66 by the installation CLIST.

As part of the setup for deploying DSN8ES3 on a remote server, the DSNTTEP2 application needs to be able to connect to the remote site.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running DSNTTEJ66, perform the manual editing described in the dependencies information in the job prolog. You must also manually tailor DSN8WLMP, the sample WLM startup procedure for DSNTPSMP. If DSNTTEJ66 runs successfully, it produces the return codes that are shown in the table below.

Table 142. DSNTTEJ66 return codes

Step	PROCSTEP	Return code
PH066S01		0000
PH066S02		0000
PH066S03		0000
PH066S04	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH066S05		0000 or 0004
PH066S06		0000
PH066S07		0000
PH066S08		0000
PH066S09		0000
PH066S10		0000
PH066S11		0000
PH066S12		0000 or 0004
PH066S13		0000
PH066S14		0000
PH066S15		0000 or 0004
PH066S16		0000

You can compare the output from this job to the sample output for DSNTTEJ66, which is found in member DSN8TJ66 in the data set named *prefix.SDSNIVPD*.

#### Job DSNTTEJ67:

Job DSNTTEJ67 shows how to convert sample external SQL procedure DSN8.DSN8ES2 to a sample native SQL procedure called DSN8.DSN8ES2. The



conversion is performed by the DB2 precompiler and various DB2 sample REXX services that are provided in member DSN8ERL1.

Before running job DSNTEJ67, you must successfully run job DSNTEJ65 to create DSN8.DSN8ES2 through the DB2 SQL procedure processor, DSNTPSMP. See the job DSNTEJ67 prolog for information about adapting this job to convert other SQL procedures that are created through DSNTPSMP.

Table 143. DSNTEJ67 return codes

Step	PROCSTEP	Return code
PH067S00		0000
PH067S01		0000
PH067S02		0000
PH067S03		0000
PH067S04		0000 or 0004

## Phase 7: Accessing LOB data

Phase 7 of the installation or migration verification process is an optional phase that demonstrates how to set up and use a DB2 LOB application. This phase creates an extension to the Employee sample database to manage employee resumes and photo images.

You run these jobs in this phase:

- DSNTEJ7: Creates and loads the employee resume and photo table.
- DSNTEJ71, DSNTEJ76: Uses LOB locators to populate the photo images, then validates that the resume and photo data is stored correctly.
- DSNTEJ73, DSNTEJ77: Prepares an ISPF application for viewing employee resume data.
- DSNTEJ75, DSNTEJ78: Prepares a GDDM application for viewing employee photo images.

Jobs DSNTEJ75 and DSNTEJ78 are not tailored by the installation CLIST unless you specify non-blank values for GDDM MACLIB and GDDM LOAD MODULES on panel DSNTIPW.

After you run these jobs, you can use ISPF and GDDM to view the sample employee resume and photo data.

### Job DSNTEJ7

Job DSNTEJ7 demonstrates how to create a LOB table with all the accompanying LOB table spaces, auxiliary tables, and indexes. DSNTEJ7 also demonstrates how to use the DB2 LOAD utility to load a LOB table.

Job DSNTEJ7 consists of the following steps:

Step	Function
1	Drops sample LOB objects
2	Creates sample Employee Resume and Photo LOB table
3	Creates aliases for the table, then grants access to it

Step	Function
4	Uses the DB2 LOAD utility to populate the table
5	Generates run time statistics on the table

If DSNTEJ7 runs successfully, it produces the return codes that are shown in the table below.

*Table 144. DSNTEJ7 return codes*

JOBSTEP	PROCSTEP	Return Code
PH07S01		0000
PH07S02		0000
PH07S03		0000 or 0004
PH07S04	DSNUPROC	0000
PH07S05	DSNUPROC	0000
PH07S06		0000
PH07S07		0000

## Job DSNTEJ71 (optional)

Job DSNTEJ71 compiles, link-edits, and binds two sample applications that manipulate LOB data.

The DSN8DLPL sample application demonstrates how to use LOB locators to populate a LOB column. The DSN8DLTC sample application validates the contents of the LOB table, verifying that it was populated correctly.

In previous releases, you had to run job DSNTEJ71 to populate LOB columns that were greater than 32 KB. In DB2 10, the LOAD utility populates all columns of the sample LOB table, so job DSNTEJ71 is optional.

If DSNTEJ71 runs successfully, it produces the return codes that are shown in the table below.

*Table 145. DSNTEJ71 return codes*

JOBSTEP	PROCSTEP	Return Code
PH071S01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH071S02	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH071S03		0000
PH071S04		0000
PH071S05		0000

You can compare the output from this job with the sample output for DSNTEJ71 found in member DSN8TJ71 in your *prefix.SDSNIVPD* data set.

## Job DSNTEJ73

Job DSNTEJ73 compiles the DSN8DLRV sample application. DSN8DLRV demonstrates how to use built-in functions like POSSTR and SUBSTR to traverse a CLOB column and extract data from it.

DSN8DLRV is written in C language and linked with ISPF and DB2 Call Attach Facility. The package name and plan name are both DSN8LR*vr*, where *vr* is the DB2 version and release.

If DSNTEJ73 runs successfully, it produces the return codes that are shown in the table below.

Table 146. DSNTEJ73 return codes

JOBSTEP	PROCSTEP	Return Code
PH073S01	PC	0004
	C	0000
	PLKED	0004
	LKED	0000
PH073S02	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH073S03		0000 or 0004

### Related tasks:

Starting an application in an ISPF/TSO environment in phase 7

## Job DSNTEJ75

Job DSNTEJ75 runs sample program DSN8DLPV, which demonstrates how to manipulate BLOB data (employee photo images).

This job is not edited by the CLIST unless the GDDM MACLIB and GDDM LOAD MODULES fields on panel DSNTIPW are non-blank.

DSN8DLPV is a C language program that is linked with ISPF, GDDM and the DB2 Call Attach Facility. The package name and plan name are both DSN8LP*vr*, where *vr* is the DB2 version and release. To run DSN8DLPV you must include the GDDM load module library (SADMMOD) in the logon procedure or in the ISPLLIB concatenation.

If DSNTEJ75 runs successfully, it produces the return codes that are shown in the table below.

Table 147. DSNTEJ75 return codes

JOBSTEP	PROCSTEP	Return Code
PH075S01	PC	0000
	C	0000
	PLKED	0004
	LKED	0000
PH075S02		0000 or 0004

**Related tasks:**

Starting an application in an ISPF/TSO environment in phase 7

## Job DSNTEJ76

Job DSNTEJ76 compiles, link-edits, and binds two sample COBOL applications that manipulate LOB data.

The DSN8CLPL sample application demonstrates how to use LOB locators to populate a LOB column that is larger than 32 KB. The DSN8CLTC sample application validates the contents of the LOB table, verifying that it was populated correctly.

If DSNTEJ76 runs successfully, it produces the return codes that are shown in the table below.

Table 148. DSNTEJ76 return codes

JOBSTEP	PROCSTEP	Return code
PH076S01	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000
PH076S02	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000
PH076S03		0000 or 0004
PH076S04		0000
PH076S05		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

After running DSNTEJ76, you can compare the output with the sample output for DSNTEJ76 found in member DSN8TJ76 in your *prefix*.SDSNIVPD data set.

## Job DSNTEJ77

Job DSNTEJ77 compiles the DSN8CLRV sample COBOL application. DSN8CLRV demonstrates how to use built-in functions, such as POSSTR and SUBSTR, to traverse a CLOB column and extract data from it.

DSN8CLRV is written in the COBOL language and linked with ISPF and DB2 Call Attach Facility. The package name and plan name are both DSN8CR*vr*, where *vr* is the DB2 version and release.

To run DSN8CLRV, you must run the first step of job DSNTEJ73 to compile DSN8SDM.

If DSNTEJ77 runs successfully, it produces the return codes that are shown in the table below.

*Table 149. DSNTEJ77 return codes*

JOBSTEP	PROCSTEP	Return Code
PH077S01	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000
PH077S02		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related tasks:**

Starting an application in an ISPF/TSO environment in phase 7

## Job DSNTEJ78

Job DSNTEJ78 runs sample COBOL program DSN8CLPV, which demonstrates how to manipulate BLOB data (employee photo images).

This job is not edited by the CLIST unless the GDDM MACLIB and GDDM LOAD MODULES fields on panel DSNTIPW are non-blank.

DSN8CLPV is a COBOL language program linked with ISPF, GDDM and the DB2 Call Attach Facility. The package name and plan name are both DSN8CP*vr*, where *vr* is the DB2 version and release. To run DSN8CLPV you must include the GDDM load module library (SADMMOD) in the logon procedure or in the ISPLLIB concatenation.

If DSNTEJ78 runs successfully, it produces the return codes that are shown in the table below.

*Table 150. DSNTEJ78 return codes*

JOBSTEP	PROCSTEP	Return Code
PH078S01	PC	0000
	COB	0000
	PLKED <sup>1</sup>	0004
	LKED	0000
PH078S02		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related tasks:**

Starting an application in an ISPF/TSO environment in phase 7

## Starting an application in an ISPF/TSO environment in phase 7

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

**Procedure**

To start the application:

1. Enter a CALL command from option 6 of the ISPF primary option menu.
2. To start the Employee Resume and Photo sample applications, enter the following:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SDM)'
```

After you enter this command, DB2 displays the sample applications panel.

Choosing option 4 or option 6 on the sample applications panel during Phase 7 invokes the "Employee Resume" sample application, which processes CLOB data. Choosing option 5 or option 7 on the sample applications panel during Phase 7 invokes the "Employee Photo" sample application, which processes BLOB data.

**Related tasks:**

Working with the employee resume and photo scenarios

Starting an application in an ISPF/TSO environment

Make DB2I panels, messages, and load modules available to ISPF and TSO

---

## The sample applications


After you run the installation verification jobs, you can use the sample applications to test and verify your new installation or migration.

The names of the sample applications have changed for DB2 10. Check to make sure you have the authority to run the DB2 10 sample programs.

Brief scenarios describe how to display, update, add, and delete information using the sample applications. Another scenario describes how to view or change information using a combination of organization and project applications. This scenario contains problem-solving exercises based upon creating and staffing a new department with new projects.

The output from the installation verification steps discussed here appears in your *prefix.SDSNIVPD* data set.

**Related tasks:**

 [Managing explicit privileges \(Managing Security\)](#)

## Printing options for the sample application listings

The source statements that are contained in *prefix.SDSNSAMP* can be printed using ISPF facilities, IEBTPCH, or local facilities.

Most of the DB2 sample applications are contained in *prefix.SDSNSAMP*. The modules making up the SQLCA formatter routine (DSNTIAR, DSNTIAC, DSNTIA1, and DSNTIAM) are not in the *prefix.SDSNSAMP* library. They are provided in object form in *prefix.SDSNLOAD*.

You might not want to print all members of *prefix.SDSNSAMP* because some of the members are large and contain unprintable data. An alternative is to precompile and compile the wanted program by specifying a cross-reference to the precompiler and compiler. This provides a cross-reference for program variables and is current.

## The sample application panels

When you run the interactive sample applications, the sample application panels require you to enter information such as the action you want to complete.

You are prompted for the following information when you run the interactive sample applications.

Sample Applications	Distributed Sample Applications
<ul style="list-style-type: none"> <li>• MAJOR SYSTEM</li> <li>• ACTION</li> <li>• OBJECT</li> <li>• SEARCH CRITERIA</li> <li>• DATA</li> </ul>	<ul style="list-style-type: none"> <li>• ACTION</li> <li>• OBJECT</li> <li>• SEARCH CRITERIA</li> <li>• LOCATION</li> <li>• DATA</li> </ul>

Regard these categories as a family of values that are used together to specify a task that is to be performed. For MAJOR SYSTEM, ACTION, OBJECT, and SEARCH CRITERIA, a character code of one or two characters is used as a form of shorthand to indicate the criteria that you want. The system provides a list of these codes with their meanings. A valid location name of 1 to 16 characters must be used for LOCATION. The value for DATA must be consistent with the data type and length of SEARCH CRITERIA.

### MAJOR SYSTEM

**MAJOR SYSTEM** specifies the major application area. In the sample application, there are two major systems: organization and project. These major systems are implemented in separate transactions to keep the plan sizes reasonable. If you are running the DB2 distributed sample program, organization is the only system; therefore, this criterion is not used.

### ACTION

**ACTION** specifies what you want to do with the object (specified on another line of the panel). You can display, update, add (insert), or erase (delete) information about the specified object.

### OBJECT

**OBJECT** specifies the object about which you want information. Normally, the action is associated with the object. Examples of objects are information about an employee (EM) or information about the relationship among departments (DS).

Objects can be specified with the following codes for the organization application:

**DE** Department—general department and manager information for department specified

**DS** Department structure—hierarchy information for department specified

**EM** Employee—information concerning employee specified.

Objects can be specified with the following codes for the project application:

**PS** Project structure—information on projects and subprojects

- AL** Activity listing—information concerning the different activities that makes up a project
- PR** Project—general project information
- AS** Activity staffing—information about the employees staffed for activities of specified projects
- AE** Activity estimate—information concerning the estimated staffing and time requirements of specified projects.

You are able only to add, update, or erase information about the selected object, although you can search and display based on other criteria. Items that are added or updated can be changed on the screen. Other fields are protected.

#### **SEARCH CRITERIA**

**SEARCH CRITERIA** helps to locate the specific item of information upon which to act.

The following codes can be specified for the search criteria field for the organization application:

- DI** Department number
- DN** Department name
- EI** Employee number
- EN** Employee name
- MI** Manager number
- MN** Manager name.

The following codes can be specified for the search criteria for the project application:

- DI** Department number
- DN** Department name
- EI** Employee number
- EN** Employee name
- PI** Project number
- PN** Project name
- RI** Responsible person number
- RN** Responsible person name.

#### **LOCATION**

**LOCATION** is used only for the distributed application. It describes the location where the action is to take place. If this criterion is left blank, then the local location is assumed.

#### **DATA**

**DATA** further identifies the search criteria target. The data value specified must be consistent with the data type and length of the search criteria code. If the search criterion is an employee name (**EN**), manager name (**MN**), or responsible person name (**RN**), the value of data must be a person's last name.

Data values can be specified by using either primary selection or secondary selection. *Primary selection* is the data value itself. Only one set of data values fulfills the request. *Secondary selection* allows multiple sets of data values to fulfill the request. A brief summary of the sets of data values appear on the



screen. Each summary has an associated line number. To display additional information about a certain line, enter the line number in the DATA field. Secondary selection allows the application to display a set of values and then provides a prompt to select a specific DATA value. For example, you can display information about a department (**DE**) (the OBJECT) with a department number (**DI**) (the SEARCH CRITERIA) with a **DATA** value of D11.

**Related concepts:**

DATA field values on the sample application panels

**Related tasks:**

Connecting distributed database systems

**Allowable combinations of values on the sample application panels**

The codes on the sample application panels cannot be combined indiscriminately.

For instance, manager number (MI) is a valid search criterion for a department (DE), but employee number (EI) and project number (PI) cannot be used to locate a department.

You can retrieve data by having the panels prompt you for the proper values. It is not necessary to enter the values one line at a time. If you already know all the values you want, they can be entered at the same time. If the values are only partially entered, you must start with ACTION and enter each value in sequence, not skipping over any values. For example, if you know all the values except OBJECT, only ACTION can be entered. You are prompted for OBJECT. Then you can enter OBJECT, SEARCH CRITERIA, and DATA.

**DATA field values on the sample application panels**

When you run the interactive sample applications, you must use the sample application panels to enter information about the task that you want to complete. Information that is entered in the DATA field on the sample application panels is used with the SEARCH CRITERIA field to define a search.

The values available for DATA are not limited to a select few as are the values for ACTION and OBJECT. There is a wider choice of DATA values and a variety of ways to express them.

If you know only part of a DATA value (for example, you know the department number begins with D), you can specify it as a *pattern*. The pattern can contain any character string with a special meaning, such as:

- The underscore character, *\_*, represents any single character.
- The percent character, *%*, represents any string of zero or more characters.

These two special characters can be used in conjunction with other characters to specify a DATA value. The following table demonstrates three ways to use these characters to create a DATA value.

*Table 151. Searching for data values*

<b>Data Value</b>	<b>Search Criteria</b>	<b>Description</b>
%SMITH%	EN (Employee name)	Searches for any last name that contains the word SMITH; for example, BLACKSMITH, SMITHSONIAN, or NESMITHA

Table 151. Searching for data values (continued)

Data Value	Search Criteria	Description
E_1	DI (Department number)	Searches for any department number with E in position 1 and 1 in position 3; for example, E71, E21, or EB1
%	Any	All values qualify

The values entered on the SEARCH CRITERIA and DATA fields can choose only one item to be displayed. However, the more usual case is that several items are displayed as a list. When this is the case, a secondary selection can be made by choosing the line number of the item of interest.

### Function keys on the sample application panels

The bottom line of each sample application panel displays the function keys that are active for that panel.

**Function key 2—Resend:** If the panel is blanked out (for example, you pressed the CLEAR key) or you want to refresh the panel, press function key 2 to return (resend) the display you were viewing to the terminal.

**Function key 3—End** To terminate the application, press function key 3 to clear the screen and continue with other transactions.

**Function key 8—Next:** Sometimes a display of information is too large to fit on one panel. Press function key 8 to scroll forward (the lines move upward).

**Function key 10—Left:** Press function key 10 to move the field of vision up one level in the department structure. For instance, in the organization application, Department E01 is shown on the left, and its subdepartments are shown on the right. When you press function key 10, the screen scrolls so that Department E01 is moved from the left side of the panel to the right side and the department to which it reports appears on the left. All other departments that report to the department now on the left also appear along with Department E01 on the right. Function key 10 performs this function only for IMS and CICS samples.

**Related tasks:**

Working with the organization application scenario

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## Working with scenarios

Work with the scenarios for using the sample applications. The method for invoking these applications depends on the environment that you are working in.

### About this task

When an application runs, many areas on the display panel might be highlighted. The data that you enter might not be highlighted, depending on the type of panel that is displayed.

**Related tasks:**

Starting an application in an ISPF/TSO environment in phase 6

Starting an application in a CICS environment

Starting an application in an IMS environment

Starting an application in an ISPF/TSO environment

## Working with the project application scenario

The project application scenario demonstrates how to view details of a project and update activities that are associated with a project.

### About this task

For example, you can find the person responsible for a project and list the activities that are assigned to one of its subprojects. Phase 4 (IMS) and Phase 5 (CICS) prepare the programs that you execute.

### Procedure

To view details of a project with the sample application:

Enter the following values on the first panel of the project application:

- On the MAJOR SYSTEM line, enter P for project.
- On the ACTION line, enter D for display.
- On the OBJECT line, enter PS for project structure.
- On the SEARCH CRITERIA line, enter PI for project ID.
- On the DATA line, enter MA2100 as the project ID.

The following example panel shows the selected project and its corresponding subprojects.

```
PROJECT STRUCTURE
MAJOR SYSTEM ...: P      PROJECTS
ACTION .....: D      DISPLAY (SHOW)
OBJECT .....: PS     PROJECT STRUCTURE
SEARCH CRITERIA.: PI   PROJECT ID
DATA .....: MA2100

PROJECT ID & NAME          SUBPROJECT ID & NAME
RESPONSIBLE ID & NAME     RESPONSIBLE ID & NAME

MA2100 WELD LINE AUTOMATION    MA2110 W L PROGRAMMING
000010 CHRISTINE I HAAS       000060 IRVING F STERN

                                PL2100 WELD LINE PLANNING
                                000020 MICHAEL L THOMPSON

PFK: 02=RESEND 03=END 08=NEXT 10=LEFT
```

Figure 88. Project application—viewing a project structure

### Updating an activity

You can use the project application to update an activity information for a project, such as the estimated start date.

### About this task

Suppose that you want to update activity information for a project with ID IF1000.

### Procedure

To update the activity:

1. Enter the following values:
  - On the MAJOR SYSTEM, enter P for project.

- On the ACTION line, enter U for update.
  - On the OBJECT line, enter AE for activity estimate.
  - On the SEARCH CRITERIA line, enter PI for project ID.
  - On the DATA line, enter IF1000 as the project ID.
2. Press the ENTER key, and a list of project IF1000 activities appears on the panel.
  3. Choose the activity to be updated. For instance, if you want to update the first activity listed, enter 1 as the DATA value and press the ENTER key. The next panel shows information about the estimated mean staffing requirements of this activity as well as the start and completion dates.
  4. To change information about the estimated end date, enter data over the existing information displayed on that input line.
  5. After you have verified the change, press ENTER. The next panel displays the updated information, as shown in the following figure:

```

                UPDATING OF AN ACTIVITY ESTIMATE
MAJOR SYSTEM ...: P          PROJECTS
ACTION .....: U          UPDATE (CHANGE)
OBJECT .....: AE         ACTIVITY ESTIMATE
SEARCH CRITERIA : PI      PROJECT ID
DATA .....: 01
DSN8024I DSN8MPX - ACTIVITY SUCCESSFULLY UPDATED
PROJECT ID           : IF1000
NAME                 : QUERY SERVICES

ACTIVITY ID         :          90
KEYWORD             : ADMQS
DESCRIPTION          : ADM QUERY SYSTEM
EST MEAN STAFFING   :          2.00
EST START DATE      : 1982-01-01
EST END DATE        : 1983-04-15

PFK: 02=RESEND 03=END

```

Figure 89. Project application—changes accepted

6. To terminate the project application, press the PF3 key. The APPLICATION TERMINATED message is displayed.

### What to do next

If you are using CICS, clear the screen and enter a new transaction code. If you are using IMS, clear the screen and enter a new transaction code or a /FORMAT command.

## Working with the organization application scenario

The organization application scenario shows how to display a list of departments within an organization and the structure of one of these departments.

### About this task

This application is executed in Phase 4 for IMS and Phase 5 for CICS.

### Procedure

To display a list of departments and the structure of one of the departments:

1. After you enter the appropriate transaction code, you see the first panel of the project application. Enter the following values:

- On the MAJOR SYSTEM, enter O for organization.
- On the ACTION line, enter D for display.
- On the OBJECT line, enter DS for department structure.
- On the SEARCH CRITERIA line, enter DI for department number.
- On the DATA line, enter %, which enables you to display a list of all the departments.

Each department entry is numbered on the far left side of the panel as shown in the figure below.

```

DEPARTMENT ADMINISTRATIVE STRUCTURE SELECTION
MAJOR SYSTEM ...: O      ORGANIZATION
ACTION .....: D      DISPLAY (SHOW)
OBJECT .....: DS      DEPARTMENT STRUCTURE
SEARCH CRITERIA.: DI    DEPARTMENT ID
DATA .....: %
SELECT A DEPARTMENT FROM FOLLOWING LIST BY SPECIFYING THE LINE NUMBER
NO D/ID DEPARTMENT NAME           M/ID  MANAGER NAME
01 A00 SPIFFY COMPUTER SERVICES DIV. 000010 CI HAAS
02 B01 PLANNING                     000020 ML THOMPSON
03 C01 INFORMATION CENTER           000030 SA KWAN
04 D01 DEVELOPMENT CENTER
05 D11 MANUFACTURING SYSTEMS        000060 IF STERN
06 D21 ADMINISTRATION SYSTEMS       000070 ED PULASKI
07 E01 SUPPORT SERVICES              000050 JB GEYER
08 E11 OPERATIONS                   000090 EW HENDERSON
09 E21 SOFTWARE SUPPORT              000100 TQ SPENSER
PFK: 02=RESEND 03=END 08=NEXT

```

Figure 90. Organization application—viewing a list of departments

2. To retrieve further information, specify a line number as a data value. This method is called secondary selection. Secondary selection provides prompts to aid in finding the information to be displayed, added, erased, or updated. If only one entry possibility exists, secondary selection is not offered. For example, to view the structure of Department E01, specify a data value of 7 on the DATA entry line (7 is the line number of the entry for Department E01). The result of entering the data value of 7 is a display of Department E01 and its departments as shown in the figure below. The department manager for E01 is listed on the left, and the departments of E01 are listed on the right. Employees of E01 are listed below the subdepartments of E01.

```

DEPARTMENT ADMINISTRATIVE STRUCTURE
MAJOR SYSTEM ...: O      ORGANIZATION
ACTION .....: D      DISPLAY (SHOW)
OBJECT .....: DS      DEPARTMENT STRUCTURE
SEARCH CRITERIA.: DI    DEPARTMENT ID
DATA .....: 07

DEPARTMENT ID & NAME           SUBDEPARTMENT ID, NAME & MANAGER
MANAGER ID & NAME             EMPLOYEE ID & NAME
E01 SUPPORT SERVICES          E11 OPERATIONS
000050 JOHN B GEYER           000090 EILEEN W HENDERSON

                                E21 SOFTWARE SUPPORT
                                000100 THEODORE Q SPENSER

                                000050 JOHN B GEYER

PFK: 02=RESEND 03=END 08=NEXT 10=LEFT

```

Figure 91. Organization application—viewing a department structure

## Starting a new operation

You can use the organization application to start a new operation such as displaying or updating a department structure.

### Procedure

To start a new operation:

Choose one of the following actions:

- Move the cursor to the D on the ACTION line and retain the D or change it to a different action (add, erase, or update). Follow the displayed options to perform your selected action.
- Alternatively, you can leave the organization application by pressing the PF3 key. If you are using CICS, enter the transaction code. If you are using IMS, clear the screen and enter the /FORMAT command to select the project application. In either case, to proceed with a different operation, select a different ACTION, OBJECT, and so forth.

## Adding a new department

You can use the organization application to add a new department and specify information about the department.

### Procedure

To add a department to the organization:

1. Start the organization application and enter the following values:
  - On the MAJOR SYSTEM line, enter O for organization
  - On the ACTION line, enter A for add (insert)
  - On the OBJECT line, enter DE for the department that is to be added
  - On the SEARCH CRITERIA line, enter DI for department ID
  - On the DATA line, enter C11, the specific department number
2. Next, you can enter the details of the new department. The four department fields are department number, department name, manager number, and administration department number. Enter the following values:
  - INFORMATION SERVICES for department name
  - 000130 for manager number
  - C01 for the administration department number

Press ENTER to display the panel shown in the figure below. The panel shows the successful addition of the new department.

```

                ADDING A NEW DEPARTMENT
MAJOR SYSTEM ...: O           ORGANIZATION
ACTION .....: A           ADD (INSERT)
OBJECT .....: DE          DEPARTMENT
SEARCH CRITERIA.: DI       DEPARTMENT ID
DATA .....: C11
DSN8012I DSN8MPE - DEPARTMENT SUCCESSFULLY ADDED
DEPARTMENT ID           : C11
NAME                   : INFORMATION SERVICES
MANAGER ID             : 000130
ADMIN DEP ID           : C01
MANAGER ID             : 000130
FIRST NAME             : DOLORES
MIDDLE INITIAL         : M
LAST NAME              : QUINTANA
WORK DEPT ID           : C01

PFK: 02=RESEND 03=END

```

Figure 92. Organization application—adding a department

#### Related tasks:

Starting a new operation

#### Deleting an entry

You can use the organization application to delete an entry from the department table.

#### About this task

Deleting an entry from the department table is a function of the organization major system.

#### Procedure

To delete an entry from the department table:

1. Replace the following values on the panel that is on your screen:
  - On the MAJOR SYSTEM line, enter O for organization.
  - On the ACTION line, enter E for erase.
  - On the OBJECT line, enter DE for department.
  - On the SEARCH CRITERIA line, enter DI for department ID.
  - On the DATA line, enter C11 for department name.
2. Press ENTER to display the panel shown in the figure below.

```

          ERASING A DEPARTMENT
MAJOR SYSTEM ...: O          ORGANIZATION
ACTION .....: E          ERASE (REMOVE)
OBJECT .....: DE         DEPARTMENT
SEARCH CRITERIA.: DI      DEPARTMENT ID
DATA .....: C11
PRESS ENTER TO ERASE A DEPARTMENT
DEPARTMENT ID      : C11
NAME               : INFORMATION SERVICES
MANAGER ID        : 000130
ADMIN DEP ID      : C01
MANAGER ID        : 000130
FIRST NAME        : DOLORES
MIDDLE INITIAL    : M
LAST NAME         : QUINTANA
WORK DEPT ID     : C01

PFK: 02=RESEND 03=END

```

Figure 93. Organization application—deletion successful

3. Press ENTER again to verify the erase action. The following message appears on the panel:

```
DSN8013I   csect DEPARTMENT SUCCESSFULLY ERASED
```

**Related tasks:**

Starting a new operation

**Transferring an employee**

The procedure for transferring one employee to another department and replacing that employee involves several steps.

**About this task**

In this scenario, John B. Geyer (manager of the department for Support Services) is transferred to the staff of Spiffy Computer Service Division. Bruce Adamson is assigned as manager of Support Services.

To move Adamson into his new position as manager of Support Services, you must determine his employee number. Transferring an employee is a function of the organization major system.

**Procedure**

To transfer an employee to another department:

1. Start the organization application and enter the following values:
  - On the MAJOR SYSTEM, enter O for organization.
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter EM for employee.
  - On the SEARCH CRITERIA line, enter EN for employee name.
  - On the DATA line, enter ADAMSON as the specific employee name.
2. Press ENTER to display the panel showing that Adamson's employee number is 000150.
3. The next step is for you to change the manager number for the Support Services department to Adamson's number, 000150. But first you must find the Support Services department. To do this, change ACTION to U (update), OBJECT to DE (department), and SEARCH CRITERIA to DN (department name). Change DATA to %SUPPORT% to specify any department with the word SUPPORT in it.



4. Press ENTER, and a list of departments with support in their name is displayed. Support Services has line number 01. Enter this number at DATA. (The leading zero is not needed.)
5. Press ENTER to display the next panel. The only values that can be changed are department name, manager ID, and administration department ID. Enter Adamson's employee number in the Support Services department after MANAGER ID. At this point, the data on the manager still pertains to Geyer.
6. Press ENTER to display the panel that shows Adamson as manager of Support Services. The work department ID shown (D11) is still Adamson's old number. To change Adamson's work department ID, enter EM for OBJECT, enter EI for SEARCH CRITERIA, and change the employee number to 000150 for DATA.
7. Press ENTER to display the employee information on Adamson. Now that information on Adamson can be updated. The fields that can be changed are employee first name, middle initial, last name, and work department ID. Enter the middle initial for Adamson, which was not in the database, and the department number E01. Press ENTER, and the information on Adamson is updated, including his new department number.
8. The final step is to move Geyer to the correct department. Change the SEARCH CRITERIA and DATA to EN and GEYER, respectively. Press ENTER to obtain the next panel. The employee ID, name, and work department ID can be changed on this panel. However, the only change necessary in this case is to change Geyer's work department ID to his new one, A00. The panel in the figure below shows the completed entry.

```

                                UPDATING AN EMPLOYEE
MAJOR SYSTEM ....: 0           ORGANIZATION
ACTION .....: U           UPDATE (CHANGE)
OBJECT .....: EM          EMPLOYEE
SEARCH CRITERIA.: EN       EMPLOYEE NAME
DATA .....: GEYER
DSN8004I DSN8MPF - EMPLOYEE SUCCESSFULLY UPDATED
DEPARTMENT ID      : A00
NAME               : SPIFFY COMPUTER SERVICE DIV.
MANAGER ID        : 000010
ADMIN DEP ID      : A00
EMPLOYEE ID       : 000050
FIRST NAME        : JOHN
MIDDLE INITIAL    : B
LAST NAME         : GEYER
WORK DEPT ID     : A00

PFK: 02=RESEND 03=END

```

Figure 94. Organization application—employee data update completed

9. To terminate the application and return to the beginning of the operation, press the PF3 key.

**Related tasks:**

Starting a new operation

## Working with the phone application scenario

The phone application retrieves information from a phone directory and updates employee phone numbers.

### About this task

The phone application is used in phase 2 (batch mode), phase 3 (CAF), and interactively in phase 4 (IMS) and phase 5 (CICS).

The phone directory consists of data from a combination (join) of the employee table (DSN8A10.EMP) and the department table (DSN8A10.DEPT). This joined view is called VPHONE. The program also uses a second view called VEMPLP to update the employee table, which does not affect a view that joins tables.

The phone application is designed to operate in batch and interactively in ISPF/TSO, IMS, and CICS. The following table describes the environments in which each phone application operates and the language in which each is written.

*Table 152. Phone programs*

Environment	Language	Name
ISPF/TSO	COBOL	DSN8SC3
ISPF/TSO	PL/I	DSN8SP3
IMS	PL/I	DSN8IP3
CICS	PL/I	DSN8CP3
batch	COBOL	DSN8BC3
batch	Fortran	DSN8BF3
batch	PL/I	DSN8BP3
batch	C	DSN8BD3

**Related tasks:**

Starting an application in an ISPF/TSO environment

**Viewing or changing an employee's telephone number**

A couple of panels are used to view or change an employee's telephone number in the sample telephone application. These panels are the same, regardless of whether IMS or CICS is used.

**Procedure**

To view or change an employee's telephone number:

1. On the first panel of the telephone application, enter the first and last name of the employee whose telephone number you want to view or change. To see an entire listing of employee numbers, put an \* next to the LAST NAME input line. If only part of a first or last name is known, use the percent character (%) to qualify the list of names to appear in the directory. For example, entering K% on the LAST NAME input line calls a list of the telephone numbers of all employees whose last name begins with a K. Similarly, the first name can be qualified.

To keep this sample program as simple as possible and to allow updating, scrolling is not used with the IMS and CICS versions. Scrolling is used with the ISPF/CAF version. Only the first panel of selected names and phone numbers can be displayed. The second panel is the Telephone Directory itself. The employee telephone number is highlighted. To update an employee telephone number, type over the highlighted number and press ENTER. To update a phone number listed under the name Heather A Nicholls, specify NICHOL% when you are not sure if there are one or two ls in Nicholls.

```

----- TELEPHONE DIRECTORY -----

      LAST NAME ==> _
      FIRST NAME ==>

LAST NAME          * FOR LIST OF ENTIRE DIRECTORY
FIRST NAME(OPTIONAL) % FOR GENERIC LIST (EX. K% = ALL K - NAMES)
                    % FOR GENERIC LIST

```

Figure 95. Telephone application—first display

2. Press ENTER to display the panel on which the phone number is highlighted.
3. If you want to change a phone number, type over the number to be changed. You can type over as many numbers as are listed in the display. For example, suppose that you want to change the phone number from 1793 to 1795. After you press ENTER, you get a message confirming the updated phone number. The panel in the following figure shows the updated panel.

```

----- TELEPHONE DIRECTORY -----

FIRST NAME MID LAST NAME  PHONE  EMPL WORK WORKDEPT
      INIT              NO    NO  DEPT NAME
HEATHER  A      NICHOLLS   1795 000140 C01 INFORMATION CENTER
.
.
.

```

Figure 96. Telephone application—updated display

### Using the phone application under batch

The sample batch phone applications are provided in Fortran (DSN8BF3), COBOL (DSN8BC3), C (DSN8BD3), and PL/I (DSN8BP3).

#### Procedure

To update or list an employee phone number:

Create a data set that contains information about the phone number that is to be updated. This data set works in combination with another data set that contains JCL for processing information. The first data set consists of card images in the format that is shown in the following table.

Table 153. Format of phone application data set

Column	Description
1	ACTION—U for update, L for list
2	Employee last name
17	Employee first name
29	Employee number
35	New phone number

The ACTION code in this card image indicates whether an employee number is to

be updated (U) or listed (L). When updating an employee phone number, only the employee number and the new phone number are specified in the data set. When listing phone numbers, the last name must be specified. Specifying the first name is optional. The \* and % can be used with the ACTION code just as they are used with the panels.

### Example

The following figure shows an example of an update data set and a list data set. Each time a number is listed or updated, a new data set is created containing a card image like the one in the following figure. The first card in the data set shows the phone number of employee number 000140 being updated (U) to 6767. The second card shows a list (L) for Heather Nicholls. The last card shows a list (L) of all employees whose first names begin with the letters MAR. The example shows the letters MAR followed by a % in the first name column to indicate that only those employees whose first names begin with MAR are to be listed.

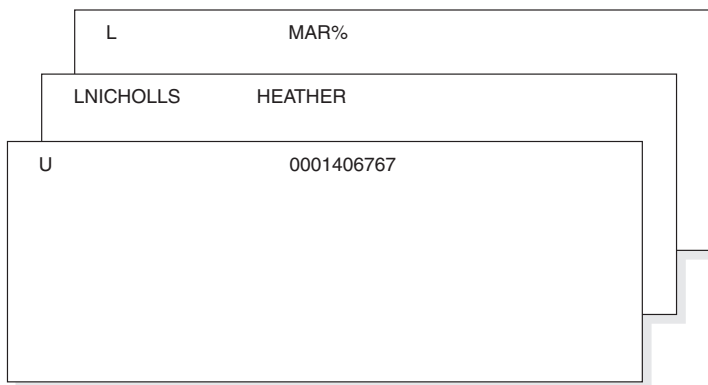


Figure 97. Example of a card image data set

The data set that contains the JCL for processing information is supplied with DB2 and is contained in DSNTEJ2P, which is part of *prefix.SDSNSAMP*. The figure below shows the data set that contains the JCL with the card image data sets embedded.

```
//PH02PS05 EXEC PGM=IKJEFT01,DYNAMNBR=20
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//REPORT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//CARDIN DD *
U                0001406767
LNICHOLLS        HEATHER
L                MAR%
//SYSTSIN DD *
DSN SYSTEM(DSN)
RUN PROGRAM(DSN8BP3) PLAN(DSN8BP10) LIB('prefix.RUNLIB.LOAD')
END
```

Figure 98. The job control language data set

The complete data set can be submitted to the system either through a card reader or from a terminal through TSO. The figure below contains an example of the batch output.

----- TELEPHONE DIRECTORY -----						
LAST NAME	FIRST NAME	INITIAL	PHONE NUMBER	EMPLOYEE NUMBER	WORK DEPT	WORK DEPT NAME
QUINTANA	DOLORES	M	6767	000130	C01	INFORMATION CENTER
NICHOLLS	HEATHER	A	1793	000140	C01	INFORMATION CENTER
SCOUTTEN	MARILYN	S	1682	000180	D11	MANUFACTURING SYSTEMS
PEREZ	MARIA	L	9001	000270	D21	ADMINISTRATIVE SYSTEMS

Figure 99. Example of the phone application batch output

## Working with the distributed organization application scenario

The distributed organization application scenario shows how to work with department and employee data in a distributed environment.

### About this task

The scenario shows how to display a department structure, display department information, and update a department at a local location. It also shows how to erase and add an employee at a remote location. This application is executed in Phase 6. The application accesses distributed data with DRDA access.

The department information (DEPT table) is shared by all locations. If you make changes to DEPT table at one location, the DEPT tables at the other locations are updated at the same time. The employee information (EMP table) is unique to each location, containing only the employees that work at that particular location.

After you enter the appropriate transaction code, you see the first panel of the organization application.

### Displaying department structure at the local location

You can use the distributed organization sample application to display department structure at the local location.

### Procedure

To display a department structure:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter DS for department structure.
  - On the SEARCH CRITERIA line, enter DI for department number.
  - On the LOCATION line, leave blank, indicating local location.
  - On the DATA line, enter A00 for department number.

```

DB2 ORGANIZATION APPLICATION

===>_
ACTION .....:d      A (ADD)          E (ERASE)
                   D (DISPLAY)       U (UPDATE)

OBJECT .....:ds     DE (DEPARTMENT)  EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :di  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)    EN (EMPLOYEE NAME)

LOCATION .....:      (Blank implies local location)

DATA .....:a00

PRESS: ENTER to process  END to exit

```

Figure 100. Starting the distributed organization application

2. Press the ENTER key. The panel below shows the structure of the department requested.

```

DB2 ORGANIZATION APPLICATION          ROW 1 of 5
===>_
PRESS: ENTER TO PROCESS  END TO EXIT

DEPARTMENT STRUCTURE FOR:

----- DEPARTMENT ID AND NAME-----  ----- MANAGER ID AND NAME-----

A00 SPIFFY COMPUTER SERVICE DIV.  000010 CHRISTINE    I HAAS

SUBDEPARTMENTS:

A00 SPIFFY COMPUTER SERVICE DIV.  000010 CHRISTINE    I HAAS
B01 PLANNING                      000020 MICHAEL      L THOMPSON
C01 INFORMATION CENTER             000030 SALLY         A KWAN
D01 DEVELOPMENT CENTER
E01 SUPPORT SERVICES              000050 JOHN          B GEYER

```

Figure 101. Displaying department structure

3. Press ENTER or END to exit.

## Displaying department information at the local location

You can use the distributed organization sample application to display department structure at the local location.

### Procedure

To display department information:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter DE for department.
  - On the SEARCH CRITERIA line, enter DI for department number.
  - On the LOCATION line, leave blank, indicating local location.
  - On the DATA line, enter A00 for department number.

```

DB2 ORGANIZATION APPLICATION

===>_

ACTION .....:d      A (ADD)          E (ERASE)
                   D (DISPLAY)       U (UPDATE)

OBJECT .....:de     DE (DEPARTMENT)   EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :di  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)    EN (EMPLOYEE NAME)

LOCATION .....:      (Blank implies local location)

DATA .....:a00

PRESS: ENTER to process  END to exit

```

Figure 102. Starting the distributed organization application

2. Press the ENTER key. The panel below shows the department information that was requested.

```

DB2 ORGANIZATION APPLICATION

===>_

                DISPLAY A DEPARTMENT

DEPARTMENT ID      : A00
NAME               : SPIFFY COMPUTER SERVICE DIV.
MANAGER ID         : 000010
ADMIN DEP ID       : A00
LOCATION            :

MANAGER ID         : 000010
FIRST NAME         : CHRISTINE
MIDDLE INITIAL     : I
LAST NAME          : HAAS
WORK DEPT ID       : A00

PRESS: ENTER TO PROCESS  END TO EXIT

```

Figure 103. Displaying department information

3. Press ENTER or END to exit.

**Updating a department at the local location**

You can use the distributed organization sample application to update department information at the local location.

**Procedure**

To update department information:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter u for update.
  - On the OBJECT line, enter de for department.
  - On the SEARCH CRITERIA line, enter di for department number.
  - Leave the LOCATION line blank, indicating local location.
  - On the DATA line, enter %, which displays a list of all the departments.

```

DB2 ORGANIZATION APPLICATION

===>_

ACTION .....:u      A (ADD)          E (ERASE)
                   D (DISPLAY)       U (UPDATE)

OBJECT .....:de     DE (DEPARTMENT)  EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :di  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)    EN (EMPLOYEE NAME)

LOCATION .....:      (Blank implies local location)

DATA .....:%

PRESS: ENTER to process  END to exit

```

Figure 104. Starting the distributed organization application

2. Press the ENTER key. The panel below lists the departments that can be updated. Select the department to be updated by inserting an S in the left margin by the department number.

```

DB2 ORGANIZATION APPLICATION      ROW 1 to 14 of 14

===>_
ACTION:  UPDATE A DEPARTMENT

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE DEPARTMENT
PRESS ENTER TO PROCESS OR END TO EXIT

D/ID  DEPARTMENT NAME                M/ID  MANAGER NAME
-----
A00   SPIFFY COMPUTER SERVICE DIV.    000010  CI HAAS
B01   PLANNING                        000020  ML THOMPSON
C01   INFORMATION CENTER              000030  SA KWAN
D01   DEVELOPMENT CENTER
D11   MANUFACTURING SYSTEMS          000060  IF STERN
D21   ADMINISTRATION SYSTEMS         000070  ED PULASKI
S E01  SUPPORT SERVICES                000050  JB GEYER
E11   OPERATIONS                     000090  EW HENDERSON
E21   SOFTWARE SUPPORT               000100  TQ SPENSER
F22   BRANCH OFFICE F2
G22   BRANCH OFFICE G2
H22   BRANCH OFFICE H2
I22   BRANCH OFFICE I2
J22   BRANCH OFFICE J2

```

Figure 105. Selecting a department to be updated

3. Press the ENTER key. The panel below displays the information relevant to the selected department. Enter the information you want to update on this panel; in this case, enter the name of the department.



```

DB2 ORGANIZATION APPLICATION

===> _

                UPDATE A DEPARTMENT

DEPARTMENT ID      : E01
NAME               : hardware support service
MANAGER ID        : 000050
ADMIN DEP ID      : A00
LOCATION           :

MANAGER ID        : 000050
FIRST NAME       : JOHN
MIDDLE INITIAL   : B
LAST NAME        : GEYER
WORK DEPT ID     : E01

PRESS: ENTER TO PROCESS   END TO EXIT

```

Figure 106. Updating a department

4. Press the ENTER key to process the updated information. A message appears on this panel that states the update was successful.

```

DB2 ORGANIZATION APPLICATION

===> _
DSN8014I  DSN8HC3-DEPARTMENT SUCCESSFULLY UPDATED
                UPDATE A DEPARTMENT

DEPARTMENT ID      : E01
NAME               : HARDWARE SUPPORT SERVICE
MANAGER ID        : 000050
ADMIN DEP ID      : A00
LOCATION           :

MANAGER ID        : 000050
FIRST NAME       : JOHN
MIDDLE INITIAL   : B
LAST NAME        : GEYER
WORK DEPT ID     : E01

PRESS: ENTER TO PROCESS   END TO EXIT

```

Figure 107. Update successfully processed

5. Press ENTER to return to the previous panel or END to exit. If you return to the previous panel, you can now select another department to update, or press ENTER or END to exit. The same message appears on this panel, indicating the update was successful.

```

DB2 ORGANIZATION APPLICATION      ROW 1 to 14 of 14
===>
DSN8014I  DSN8HC3-DEPARTMENT SUCCESSFULLY UPDATED
ACTION:  UPDATE A DEPARTMENT

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE DEPARTMENT
PRESS ENTER TO PROCESS OR END TO EXIT

D/ID  DEPARTMENT NAME                M/ID  MANAGER NAME
A00   SPIFFY COMPUTER SERVICE DIV.   000010 CI HAAS
B01   PLANNING                       000020 ML THOMPSON
C01   INFORMATION CENTER             000030 SA KWAN
D01   DEVELOPMENT CENTER
D11   MANUFACTURING SYSTEMS         000060 IF STERN
D21   ADMINISTRATION SYSTEMS        000070 ED PULASKI
E01   HARDWARE SUPPORT SERVICE      000050 JB GEYER
E11   OPERATIONS                    000090 EW HENDERSON
E21   SOFTWARE SUPPORT              000100 TQ SPENSER
F22   BRANCH OFFICE F2
G22   BRANCH OFFICE G2
H22   BRANCH OFFICE H2
I22   BRANCH OFFICE I2
J22   BRANCH OFFICE J2

```

Figure 108. Department successfully updated

## Adding an employee at a remote location

You can use the distributed organization sample application to add information for employees at remote locations.

### Procedure

To add an employee at a remote location:

1. Enter the following values:
  - On the ACTION line, enter a for add.
  - On the OBJECT line, enter em for employee.
  - On the SEARCH CRITERIA line, enter ei for employee number.
  - On the LOCATION line, enter your server location for the remote location.
  - On the DATA line, enter the employee ID of the employee to be added (sj0100 in the example below).

```

DB2 ORGANIZATION APPLICATION

===>_

ACTION .....:a      A (ADD)          E (ERASE)
                   D (DISPLAY)       U (UPDATE)

OBJECT .....:em     DE (DEPARTMENT)  EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :ei  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)    EN (EMPLOYEE NAME)

LOCATION .....:your server location (Blank implies local location)

DATA .....:sj0100

PRESS: ENTER to process  END to exit

```

Figure 109. Starting the distributed organization application

2. Press the ENTER key. The panel below allows you to enter information only about the employee. The department information on the panel is protected. Enter the necessary information about the employee.

```

DB2 ORGANIZATION APPLICATION

===>_

                ADD    AN EMPLOYEE

DEPARTMENT ID      :
NAME               :
MANAGER ID        :
ADMIN DEP ID      :
LOCATION           :

EMPLOYEE ID       : SJ0100
FIRST NAME        : W
MIDDLE INITIAL    :
LAST NAME         : WALTERS
WORK DEPT ID     : F22

PRESS: ENTER TO PROCESS  END TO EXIT

```

Figure 110. Employee to be added

3. Press the ENTER key to process or END to exit. If you press the ENTER key, a message appears on the panel indicating that the employee has been added.

```

DB2 ORGANIZATION APPLICATION
===>_
DSN8002I  DSN8HC3-EMPLOYEE SUCCESSFULLY ADDED
          ADD      AN EMPLOYEE

DEPARTMENT ID      : F22
NAME               : SPIFFY COMPUTER SERVICE DIV.
MANAGER ID         :
ADMIN DEP ID       : E01
LOCATION             : SAN_JOSE

EMPLOYEE  ID       : SJ0100
FIRST NAME  : W
MIDDLE INITIAL :
LAST NAME   : WALTERS
WORK DEPT ID : F22

PRESS: ENTER TO PROCESS  END TO EXIT

```

Figure 111. Employee successfully added

4. Press the ENTER key to return to the selection panel or END to exit.

### Erasing an employee at a remote location

You can use the distributed organization sample application to erase information for employees at remote locations.

#### Procedure

To erase an employee at a remote location:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter e for erase.
  - On the OBJECT line, enter em for employee.
  - On the SEARCH CRITERIA line, enter ei for employee number.
  - On the LOCATION line, enter your server location for the remote location.
  - On the DATA line, enter %, which displays a list of all the employees.

```

DB2 ORGANIZATION APPLICATION
===>_

ACTION .....:e      A (ADD)           E (ERASE)
                  D (DISPLAY)        U (UPDATE)

OBJECT .....:em     DE (DEPARTMENT)   EM (EMPLOYEE)
                  DS (DEPT STRUCTURE)

SEARCH CRITERIA :ei  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                  DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                  MI (MANAGER ID)     EN (EMPLOYEE NAME)

LOCATION .....:your server location (Blank implies local location)

DATA .....:%

PRESS: ENTER to process  END to exit

```

Figure 112. Starting the distributed organization application

2. Press the ENTER key. The panel below lists the employees that can be erased. Select the employee to be erased by inserting an S in the left margin by the employee ID.

```

DB2 ORGANIZATION APPLICATION          ROW 1 OF 4
===>_
ACTION: ERASE  AN EMPLOYEE           LOCATION: SAN_JOSE

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE EMPLOYEE
PRESS ENTER TO PROCESS OR END TO EXIT

E/ID    EMPLOYEE NAME                D/ID    DEPARTMENT NAME
S SJ0100  W WALTERS                        F22     BRANCH OFFICE F22
SJ0020  S O'SHEA                          F22     BRANCH OFFICE F22
SJ0030  D COOPER                            F22     BRANCH OFFICE F22
SJ0040  A HAYES                             F22     BRANCH OFFICE F22
SJ0050  L ASHER                              F22     BRANCH OFFICE F22

```

Figure 113. Selecting an employee at a remote location

3. Press the ENTER key. The panel below displays the information relevant to the selected employee that is to be erased.

```

DB2 ORGANIZATION APPLICATION
===>_

ERASE  AN EMPLOYEE

DEPARTMENT ID      : F22
NAME               : BRANCH OFFICE F22
MANAGER ID        :
ADMIN DEP ID      : E01
LOCATION            : SAN_JOSE

EMPLOYEE ID       : SJ0100
FIRST NAME        : W
MIDDLE INITIAL    :
LAST NAME         : WALTERS
WORK DEPT ID     : F22

PRESS: ENTER TO PROCESS  END TO EXIT

```

Figure 114. Employee to be erased

4. Press the ENTER key to erase the employee information. A message appears on the panel stating the employee has been successfully erased. You can now erase another employee or press ENTER or END to exit.

```

DB2 ORGANIZATION APPLICATION          ROW 1 OF 3
===>
DSN8003I  DSN8HC3-EMPLOYEE SUCCESSFULLY ERASED
ACTION:   ERASE AN EMPLOYEE          LOCATION: SAN_JOSE

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE EMPLOYEE
PRESS ENTER TO PROCESS OR END TO EXIT

E/ID      EMPLOYEE NAME                D/ID      DEPARTMENT NAME
SJ0020    S  O'SHEA                      F22       BRANCH OFFICE F22
SJ0030    D  COOPER                        F22       BRANCH OFFICE F22
SJ0050    L  ASHER                          F22       BRANCH OFFICE F22

```

Figure 115. Employee at a remote location erased

## Working with the employee resume and photo scenarios

The LOB sample application extends the existing DB2 sample employee database by adding a new table for storing employee resumes and photographs as CLOB and BLOB entries.

### About this task

The supporting JCL, application objects, and input data for this table are provided.

The purpose of the LOB sample application is to:

- Provide an IVP for LOB functions.
- Demonstrate how to:
  - Use DDL to create LOB objects.
  - Use the DB2 LOAD utility to populate LOB columns of 32K bytes or less.
  - Create an application program to populate LOB columns of greater than 32K bytes.
  - Use LOB locators and related functions to manipulate LOBs without materializing the data.

The LOB sample application consists of a batch portion and an optional online portion. The batch portion verifies that LOB objects can be created, populated, and successfully read by using locators and supporting functions. The online portion demonstrates further techniques for using and manipulating LOB data.

The batch portion of the LOB sample application consists of the following jobs: DSNTEJ7, DSNTEJ71, DSNTEJ73, DSNTEJ75, DSNTEJ76, DSNTEJ77, and DSNTEJ78.

The optional online portion of the LOB sample application adds two additional scenarios to the existing three scenarios that are provided in IVP phase 3. These scenarios include the following user activities:

1. Invoking the DB2 sample connection manager to display the DB2 ISPF sample application menu, DSN8SSM.
2. Selecting and viewing sample employee resumes by using option 4 of DSN8SSM.

3. Selecting and viewing sample employee photo images by using option 5 of DSN8SSM.

Application programs for the LOB sample are written in the C and COBOL languages. The resume viewer requires ISPF. The photo viewer requires ISPF and GDDM.

**Related concepts:**

Phase 7: Accessing LOB data

**Using the resume application in the LOB application scenario**

You can view employee resumes with the resume application in the LOB application scenario.

**About this task**

The LOB application begins with the initial panel of the ISPF/CAF application.

**Procedure**

To view employee resumes:

1. From the DB2 Sample Application Menu, DSN8SSM, select one of the following options:
  - If you ran job DSNTEJ73, select option 4.
  - If you ran job DSNTEJ77, select option 6.DSN8DLRV and DSN8CLRV show the following panels for selecting and viewing sample employee resumes until you press the END key to exit ISPF.

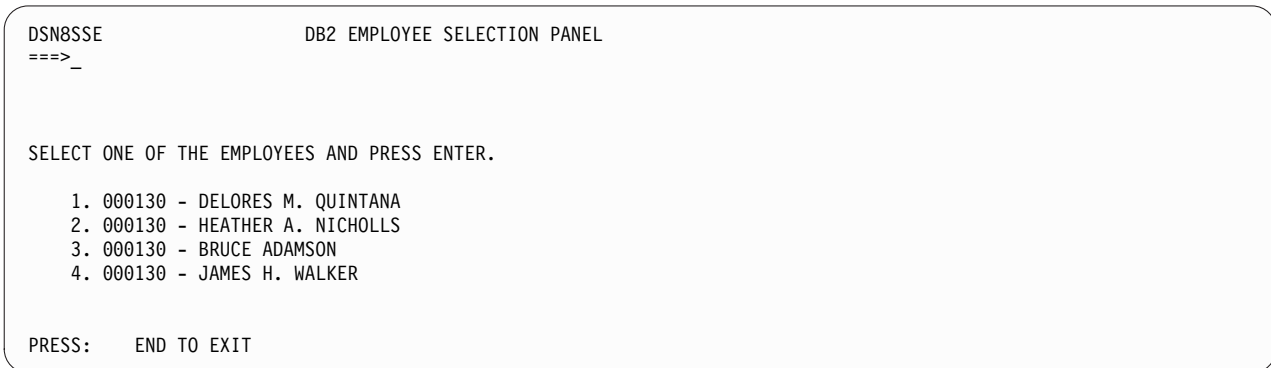


Figure 116. DB2 Employee Selection Panel

2. Select from the list of available resumes that are displayed on ISPF panel DSN8SSE.

The employee serial numbers and names are hard-coded into the panel because the data for this sample is predetermined. The formatted resume is displayed on ISPF panel DSN8SSR:

```

DSN8SSR                DB2 EMPLOYEE RESUME APPLICATION
===> _

PERSONAL INFORMATION:          DEPARTMENT INFORMATION:
- NAME: DELORES M. QUINTANA    - EMPLOYEE NO. : 000130
- HOME: 1150 EGLINTON AVE      - DEPARTMENT NO.: C01
      MELLONVILLE, IDAHO 83757  - MANAGER       : SALLY KWAN
      (208) 555-9933            - POSITION        : ANALYST
- BORN: SEPTEMBER 15, 1925     - PHONE         : (208) 555-4578
- SEX: FEMALE HT:5'2" WT:120 LBS. - HIRE DATE      : 1971-07-28
- MARITAL STATUS: MARRIED

EDUCATION:
1965 MATH AND ENGLISH B.A.      1960 DENTAL TECHNICIAN
      ADELPHI UNIVERSITY          FLORIDA INSTITUTE OF TECHNOLOGY

WORK HISTORY:
10/91 - PRESENT ADVISORY SYSTEMS ANALYST
      PRODUCING DOCUMENTATION TOOLS FOR ENGINEERING DEPARTMENT
12/85 - 9/91   TECHNICAL WRITER
      WRITER, TEXT PROGRAMMER, AND PLANNER
1/79 - 11/85  COBOL PAYROLL PROGRAMMER
      WRITING PAYROLL PROGRAMS FOR A DIESEL FUEL COMPANY

```

Figure 117. DB2 Employee Resume Application

This panel is designed around the sample data. It is assumed that all resume information for an employee will fit predictably and no handling for special cases is provided. The "Interests" section of the resume is not presented because of space constraints on the panel.

**Related tasks:**

Starting an application in an ISPF/TSO environment

**Using the photo application in the LOB application scenario**

You can view employee photos with the photo application in the LOB application scenario.

**About this task**

The LOB application begins with the initial panel of the ISPF/CAF application. This LOB application requires that you include the GDDM load module library (SADMMOD) in your logon procedure or in the ISPLLIB concatenation.

**Procedure**

1. From the DB2 Sample Application Menu, DSN8SSM, select one of the following options to look at employee photos through GDDM:
  - If you ran job DSNTEJ75, select option 5.
  - If you ran job DSNTEJ78, select option 8.

DSN8DLPV and DSN8CLPV show the following panel for selecting and viewing sample employee photos until you press the END key to exit ISPF.



```

DSN8SSE                DB2 EMPLOYEE SELECTION PANEL
====> _

SELECT ONE OF THE EMPLOYEES AND PRESS ENTER.

1. 000130 - DELORES M. QUINTANA
2. 000130 - HEATHER A. NICHOLLS
3. 000130 - BRUCE ADAMSON
4. 000130 - JAMES H. WALKER

PRESS:  END TO EXIT

```

Figure 118. DB2 Employee Selection Panel

2. Select from the list of available photos by that are displayed on ISPF panel DSN8SSE.

**Related tasks:**

Starting an application in an ISPF/TSO environment

**Sample LOB table: EMP\_PHOTO\_RESUME**

The LOB sample application uses the EMP\_PHOTO\_RESUME table. The sample jobs create, load, and manipulate the table.

Table 154. EMP\_PHOTO\_RESUME table

Column Name:	EMPNO	EMP_ROWID	PSEG_PHOTO	BMP_PHOTO	RESUME
Type:	CHAR(6) NOT NULL	ROWID	BLOB(500K)	BLOB(100K)	CLOB(5K)
Description:	Employee number	Row identifier	Employee photo (PSEG)	Employee photo (BMP)	Employee resume
Values:	000130	#####	Delores M. Quintana	Delores M. Quintana	Delores M. Quintana
Values:	000140	#####	Heather A Nicholls	Heather A Nicholls	Heather A Nicholls
Values:	000150	#####	Bruce Adamson	Bruce Adamson	Bruce Adamson
Values:	000190	#####	James H. Walker	James H. Walker	James H. Walker

**Edit exit routine**

The edit exit routine encodes the salary column to protect the confidentiality of the employee's salary.

The edit exit routine is prepared in Phase 1. It works with the employee table (DSN8A10.EMP) and is written in assembler language.

The name of the edit exit routine is DSN8EAE1. When the employee table (DSN8A10.EMP) is changed by either an update or an add, the edit exit routine encodes the salary amount that goes into the SALARY column. When the SALARY column is read from the employee table, the amount is decoded. The encoding and decoding of the salary column protects the confidentiality of the employee's salary.

**Recommendation:**



If you are migrating from DB2 Version 8 and you set the RRF subsystem parameter to ENABLE, use DSN8EAE9 rather than DSN8EAE1 as the name of the sample edit exit routine and module. Setting the RRF subsystem parameter to ENABLE specifies that newly created table spaces are to store data in reordered row format. If DB2 has already loaded the DSN8EAE1 edit exit routine for DB2 Version 8, sample job DSNTEJ1 might fail in job step PH01S13 with ABEND0C4 reason code 11. The failure occurs because the DB2 Version 8 DSN8EAE1 module supports only the basic row format. DSN8EAE1 is automatically changed to DSN8EAE9 in job DSNTEJ1 when you run the installation CLIST in ENFM mode.

From V8

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## Huffman compression exit routine

IBM supplies a sample edit routine that compresses data using the Huffman algorithm.

Before using any data compression routine, understand its limitations and consider tailoring it to your particular table. For the restrictions and concerns that apply to the IBM sample, see the comments provided with the code. The routine is called DSN8HUFF and resides in library *prefix*.SDSNSAMP. IBM supplies a sample edit routine that compresses data using the Huffman algorithm.

---

## Sample field procedure

A sample field procedure is prepared in Phase 1 of the installation or migration verification process. This procedure causes values in a CHAR(6) column to be ordered in the ASCII sorting sequence.

---

## Dynamic SQL statements: DSNTESA, DSNTESQ

*prefix*.SDSNSAMP library members DSNTESA and DSNTESQ contain dynamic SQL statements to help verify the success of an installation or migration.

### DSNTESA

The SQL statements in DSNTESA are run dynamically by SPUFI. DSNTESA is used in Phase 3 of the verification process.

The first group of statements in DSNTESA create a temporary work file table space and defines a created temporary table. The INSERT statements fill the table with names, midterm scores, and final examination results, and the SELECT statement then does a check of the averages. The UPDATE statements assign a grade according to the formula in the first UPDATE statement: 60% for the final and 40% for the midterm. The next SELECT statement produces the entire table. The ROLLBACK statement removes the table space and the table within it.

GUPI

The following statements make some administrative queries on the system tables:

- The following SELECT statements find all the plans and packages that are owned by the current user, and the date they were bound.

```
SELECT NAME, BINDDATE
      FROM SYSIBM.SYSPLAN
      WHERE CREATOR = USER;
```

```
SELECT COLLID, NAME, VERSION, BINDTIME
      FROM SYSIBM.SYSPACKAGE
      WHERE OWNER = USER;
```

- The following SELECT statements find the plans and packages that require a bind or rebind before they can be run, and the plans and packages that are automatically rebound the next time they are run.

```
SELECT NAME, CREATOR, BINDDATE, VALID, OPERATIVE
      FROM SYSIBM.SYSPLAN
      WHERE OPERATIVE = 'N' OR VALID = 'N';
```

```
SELECT COLLID, NAME, VERSION, BINDTIME, VALID
      FROM SYSIBM.SYSPACKAGE
      WHERE OPERATIVE = 'N' OR VALID = 'N';
```

- The following SELECT statements find all objects required for the current user's programs.

```
SELECT DNAME, BTYPE, BCREATOR, BNAME
      FROM SYSIBM.SYSPLANDEP
      WHERE BCREATOR = USER
      ORDER BY DNAME, BTYPE, BCREATOR, BNAME;
```

```
SELECT DCOLLID, DNAME, BTYPE, BQUALIFIER, BNAME
      FROM SYSIBM.SYSPACKDEP
      WHERE BQUALIFIER = USER
      ORDER BY DCOLLID, DNAME, BTYPE, BQUALIFIER, BNAME;
```

- The second SELECT from SYSTABLES provides information about all the DEPT tables regardless of the owner.

```
SELECT *
      FROM SYSIBM.SYSTABLES
      WHERE NAME = 'DEPT';
```

- The SELECT from SYSCOLUMNS supplies a description of the fields of the DSN8A10.DEPT table. This information can also be provided by DCLGEN, and, within a program, the DESCRIBE statement gives this same information.

```
SELECT NAME, COLTYPE, LENGTH, SCALE, NULLS, REMARKS, COLNO
      FROM SYSIBM.SYSCOLUMNS
      WHERE TBNAME= 'DEPT' AND TBCREATOR = 'DSN8610'
      ORDER BY COLNO;
```

- The following SELECT statements find the kinds of authority a user can have. Determining which tables a specific user can access is relatively complicated because of the various authorities. If the user has SYSADM authority, any table can be accessed.

```
SELECT * FROM SYSIBM.SYSPLANAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSPACKAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSUSERAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSDBAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSTABAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSCOLAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSRESAUTH WHERE GRANTEE = USER;
```

- The final four SELECT statements show the tables and views that can be accessed directly by the current user, those that can be accessed using a plan, and those that are accessed using the database authority.

```
SELECT TCREATOR, TTNAME, STNAME, GRANTOR
      FROM SYSIBM.SYSTABAUTH
      WHERE GRANTEE = USER;
SELECT BNAME, BTYPE, GRANTOR, NAME
      FROM SYSIBM.SYSPLANAUTH, SYSIBM.SYSPLANDEP
      WHERE GRANTEE = USER
      AND NAME = DNAME
```

```

        AND EXECUTEAUTH ^= ' '
        AND (BTYPE = 'T' OR BTYPE = 'V');
SELECT DCOLLID, BNAME, BTYPE, BQUALIFIER, BNAME
FROM SYSIBM.SYSPACKAUTH, SYSIBM.SYSPACKDEP
WHERE GRANTEE = USER
      AND COLLID = DCOLLID
      AND NAME = DNAME
      AND EXECUTEAUTH ^= ' '
      AND (BTYPE = 'T' OR BTYPE = 'V');
SELECT NAME, CREATOR, TYPE, DBNAME, TSNAME
FROM SYSIBM.SYSTABLES
WHERE DBNAME IN
      (SELECT NAME FROM SYSIBM.SYSDBAUTH
       WHERE GRANTEE = USER
        AND DBADMAUTH ^= ' ');

```



## DSNTESQ

DSNTESQ contains a set of queries to check consistency between catalog tables.

The SQL statements are in a format available for input to SPUFI and DSNTPE2. If SPUFI is not bound when you want to execute these queries, you can use DSNTPE2 from your previous DB2 version.

Before running these queries, you should run the DSN1CHKR utility to make sure the physical structure of the catalog is correct. You should also run the CHECK INDEX utility.

DSNTESQ contains SQL that creates copies of the catalog using segmented table spaces. In some cases, the queries in DSNTESQ run faster when run on copies of the catalog instead of the actual catalog because the copies have additional indexes. If you plan to use the copies of the catalog, use the comment lines in DSNTESQ for guidance.


---

## Dynamic SQL programs: DSNTIAD, DSNTPE2, DSNTIAUL

DSNTIAD, DSNTPE2, and DSNTIAUL are sample dynamic SQL programs and must be compiled, link-edited, and bound as usual.

SPUFI is a part of the distributed product. An installation job is used to bind it. It can be used only with ISPF.

### Related concepts:

 Sample applications supplied with DB2 for z/OS (DB2 Application programming and SQL)

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## Chapter 9. Premigration queries for migration to DB2 11 (DSNTIJPB)

If you plan to migrate to DB2 11, you can prepare for migration by running job DSNTIJPB and making adjustments that are suggested in the description of each query.

1. Existence of the sample database from DB2 10. This sample database is required to verify migration to DB2 11 conversion mode.
2. Existence of user-defined DB2 catalog indexes that are on user-managed storage. Before you migrate to DB2 11 enable-new-function mode, you must define a shadow data set for each of these indexes. DB2 uses the shadow data set during job DSNTIJEN when it runs REORG to change the catalog table spaces to DB2 11 new-function mode.
3. Existence of user-defined DB2 catalog indexes on the DB2 catalog that are on storage that is managed by DB2. Before you migrate to DB2 11 enable-new-function mode, review the current space allocations of the data sets for these indexes, and increase the space for any that are approaching capacity.
4. Existence of plans that are candidates for automatic binding in DB2 11. Plans that were last bound before DB2 9 are not supported in DB2 11 conversion mode and later. If the ABIND subsystem parameter is set to YES or COEXIST, such plans are automatically rebound the first time that they are used. If the ABIND subsystem parameter is set to NO, SQLCODE -908 is issued for any attempts to use such plans until those plans are explicitly rebound.
5. Existence of packages that are candidates for automatic binding in DB2 11. Packages that were last bound before DB2 9 are not supported in DB2 11 conversion mode and later. If the ABIND subsystem parameter is set to YES or COEXIST, such packages are automatically rebound the first time that they are used. If the ABIND subsystem parameter is set to NO, SQLCODE -908 is issued for any attempts to use such packages until those packages are explicitly rebound.
6. Existence of EXPLAIN tables that are not in the current release format. Use of such EXPLAIN tables is deprecated and support for such EXPLAIN tables might be removed in a future release of DB2. Use sample job DSNTIJXA to alter all tables in a specified schema to the current release format.
7. Existence of materialized query tables (MQTs) on the DB2 catalog or views that are based on the catalog that are affected by the CATENFM utility. You must drop these MQTs before you begin migration to DB2 11. Otherwise, CATENFM utility processing fails with SQLCODE -750. You can re-create these tables after job DSNTIJEN is complete.
8. Existence of AMI-based MQ functions in the DB2MQ1C, DB2MQ2C, DB2MQ1N, and DB2MQ2N schemas that are no longer supported. Before you begin migration to DB2 11, identify applications that use these functions and modify them to use the MQI-based replacement functions.
9. Existence of MQSeries XML routines that are no longer supported. Before you begin migration to DB2 11, identify and modify applications that use these functions.
10. Existence of simple table spaces. Simple table spaces should be converted to a different table space type.

11. Existence of trigger packages that have an invalid section number (SECTNOI) in the SYSIBM.SYSPACKSTMT catalog table. You must drop and re-create affected triggers to correct the SECTNOI entry before you begin migration to DB2 11.
12. Existence of views that have a period specification. Support for such views is discontinued in DB2 10 and the views cannot be migrated to DB2 11. Drop these views before you begin migration to DB2 11.
13. Existence of MQTs that have a period specification. Support for such MQTs was discontinued in DB2 10 and the MQTs cannot be migrated to DB2 11. Drop these MQTs before you begin migration to DB2 11.
14. Existence of SQL functions that have a period specification. Support for such functions was discontinued in DB2 10 and the functions cannot be migrated to DB2 11. Remove these functions before you begin migration to DB2 11.
15. Existence of catalog table spaces that have an oldest version number that is greater than its current version number. Such table spaces cause job DSNTIJTC to fail. Before migration, use the MODIFY RECOVERY utility and REORG TABLESPACE utility to correct the table space version numbers.
16. Existence of package dependencies on table spaces that are dropped during enabling-new-function mode processing. Before migration to DB2 11, modify your applications to use the replacement table spaces as follows:
  - Instead of SYSCOPY, use SYSTSCPYP
  - Instead of SYSSTR, use SYSTSCKS, SYSTSCHX, SYSTSCKD, and SYSTSSRG
  - Instead of SYSRTSTS, use SYSTSTSS and SYSTSISS

## Chapter 10. Working with additional capabilities for DB2

After you complete the installation or migration process, you can work with additional capabilities of DB2 such as stored procedures and remote communication.

### Installation information for procedures and functions that are supplied with DB2

DB2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

For supplied routines, job DSNTIJRW creates the core WLM environments that are listed in the following table. If you decide to set up your own WLM application environments, use the following table to help you group the supplied routines into the appropriate environments. If your system resources are constrained, you might need to choose a lower NUMTCB value than the recommended one.

For more information about each of the stored procedures that are provided with DB2, see Procedures that are supplied with DB2 (DB2 SQL).

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
ADMIN_COMMAND_DB2	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_COMMAND_DSN	SYSPROC	1	DSNWLM_REXX	No	No
ADMIN_COMMAND_MVS	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_COMMAND_UNIX	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	No	Yes
ADMIN_DS_BROWSE	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_DELETE	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_LIST	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_RENAME	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_SEARCH	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_WRITE	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_INFO_HOST	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SMS	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
ADMIN_INFO_SQL	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SSID	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SYSLOG	SYSPROC	1	DSNWLM_REXX	No	No
ADMIN_INFO_SYSPARM	SYSPROC	1	DSNWLM_NUMTCB1	No	No
ADMIN_JOB_CANCEL	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_FETCH	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_QUERY	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_SUBMIT	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	No	Yes
ADMIN_TASK_ADD	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_TASK_CANCEL	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_TASK_LIST	DSNADM	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_TASK_OUTPUT	DSNADM	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_TASK_REMOVE	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
ADMIN_TASK_STATUS	DSNADM	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_TASK_UPDATE	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_UPDATE_SYSPARM	SYSPROC	1	DSNWLM_REXX	No <sup>1</sup>	No
ADMIN_UTL_EXECUTE	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	Yes
ADMIN_UTL_MODIFY	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_UTL_MONITOR	SYSPROC	40 - 60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_UTL_SCHEDULE	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ADMIN_UTL_SORT	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
ALTER_JAVA_PATH	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
CREATE_SESSION	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
DB2_INSTALL_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
DB2_REMOVE_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
DB2_REPLACE_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
DB2_UPDATEJARINFO	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
DBG_ENDSESSIONMANAGER	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_INITIALIZECLIENT	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_LOOKUPSESSIONMANAGER	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_PINGSESSIONMANAGER	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_RECVCLIENTREPORTS	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_RUNSESSIONMANAGER	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DBG_SENDCLIENTCOMMANDS	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_SENDCLIENTREQUESTS	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DBG_TERMINATECLIENT	SYSPROC	5 - 20	DSNWLM_DEBUGGER	No	No
DEBUGGERLEVEL	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
DESTROY_SESSION	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
DSN_WLM_APPLENV	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DSNACCOR	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DSNACCOX	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DSNACICS	SYSPROC	40	DSNWLM_CICS	Yes	No
DSNAEXP	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DSNAHVPM	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
DSNAIMS	SYSPROC	40	DSNWLM_GENERAL	Yes	No
DSNAIMS2	SYSPROC	40	DSNWLM_GENERAL	Yes	No
DSNTBIND	SYSPROC	1	DSNWLM_REXX	No	No
DSNLEUSR	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
DSNTPSMP	SYSPROC	1	DSNWLM_REXX	No <sup>1</sup>	No
DSNUTILS	SYSPROC	1	DSNWLM_UTILS	Yes	No
DSNUTILU	SYSPROC	1	DSNWLM_UTILS	Yes	No
DSNWSPM	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
DSNWZP	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
GET_CONFIG	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
GET_MESSAGE	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
GET_REPORT	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
GET_SYSTEM_INFO	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
INSTALL_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
LIST_SESSION	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
MQREAD	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQREADALL	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No



Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
MQREADALLCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQREADCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVE	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVEALL	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVEALLCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVECLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQSEND	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
PUT_COMMAND	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
QUERY_SESSION	DB2DEBUG	5 - 20	DSNWLM_DEBUGGER	No	No
REMOVE_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
REPLACE_JAR	SQLJ	40 - 60	DSNWLM_GENERAL	No	No
SET_PLAN_HINT	SYSPROC	40 - 60	DSNWLM_GENERAL	No	No
SOAPHTTPC	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPNC	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPNV	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPV	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SQLCAMESSAGE	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLCOLPRIVILEGES	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLCOLUMNS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLFOREIGNKEYS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLFUNCTIONCOLS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLFUNCTIONS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLGETTYPEINFO	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLPRIMARYKEYS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLPROCEDURECOLS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLPROCEDURES	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLPSEUDOCOLUMNS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLSPECIALCOLUMNS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLSTATISTICS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLTABLEPRIVILEGES	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLTABLES	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SQLUDTS	SYSIBM	40 - 60	DSNWLM_GENERAL	No	No
SYSTS_ALTER	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_CREATE	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_DROP	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_ENCRYPT	SYSFUN	2 - 8 <sup>2</sup>	DSNWLM_JAVA	No	No
SYSTS_RESTORE	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_START	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_STOP	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_TAKEOVER	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
SYSTS_UPDATE	SYSPROC	10 - 40	DSNWLM_GENERAL	No	No
WLM_REFRESH	SYSPROC	40 - 60	DSNWLM_GENERAL	Yes	No
WLM_SET_CLIENT_INFO	SYSPROC	> 1	DSNWLM_GENERAL	No	No
XSLTRANSFORM	SYSFUN	2 - 8 <sup>2</sup>	DSNWLM_JAVA	No	No
XSR_ADDSCHEMADOC	SYSPROC	40 - 60	DSNWLM_XML	Yes	No
XSR_COMPLETE	SYSPROC	2 - 8 <sup>2</sup>	DSNWLM_JAVA	No	No
XSR_REGISTER	SYSPROC	40 - 60	DSNWLM_XML	Yes	No
XSR_REMOVE	SYSPROC	40 - 60	DSNWLM_XML	Yes	No

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
<b>Notes:</b>					
1. This routine cannot run in an APF-authorized environment.					
2. If you are running your Java stored procedures in 64-bit JVMs, the recommended NUMTCB is 25. You cannot run XSR_COMPLETE in a 64-bit Java virtual machine (JVM).					

## Routine setup information in DSNTIDxx

To install the DB2-supplied routines, job DSNTIJRT uses setup information that is stored in the CLIST defaults input member (DSNTIDxx). Each DB2-supplied routine is represented by a different name in DSNTIDxx. The following table shows the mapping between each DSNTIDxx name and DB2-supplied routine. The left column contains the DSNTIDxx name and the right column contains the routine name. The xxx in the DSNTIDxx names represent the letters that specify the WLM environment name, the grant execute list, and the package owner. For example, RTB01xxx represents RTB01WLM, RTB01ACL, and RTB01PKO.

Table 155. Mapping between DSNTIDxx variables and DB2-supplied routines

DSNTIDxx variable	Stored procedure name
RTB01xxx	DSNWSPM
RTB02xxx	DSNWZP
RTC01xxx	DSNUTILS
RTC02xxx	DSNUTILU
RTD01xxx	DSNACCOR
RTD02xxx	DSNACCOX
RTE01xxx	DSNLEUSR
RTF01xxx	DSNTBIND
RTF02xxx	DSNTPSMP
RTF03xxx	WLM_REFRESH
RTG01xxx	ALTER_JAVA_PATH
RTG02xxx	DB2_INSTALL_JAR
RTG03xxx	DB2_REMOVE_JAR
RTG04xxx	DB2_REPLACE_JAR
RTG05xxx	DB2_UPDATEJARINFO
RTG06xxx	INSTALL_JAR
RTG07xxx	REMOVE_JAR
RTG08xxx	REPLACE_JAR
RTH01xxx	CREATE_SESSION
RTH02xxx	DEBUGGERLEVEL
RTH03xxx	DESTROY_SESSION
RTH04xxx	GET_REPORT
RTH05xxx	LIST_SESSION
RTH06xxx	PUT_COMMAND

Table 155. Mapping between DSNTIDxx variables and DB2-supplied routines (continued)

DSNTIDxx variable	Stored procedure name
RTH07xxx	QUERY_SESSION
RTH08xxx	DBG_ENDSESSIONMANAGER
RTH09xxx	DBG_INITIALIZECLIENT
RTH10xxx	DBG_LOOKUPSESSIONMANAGER
RTH11xxx	DBG_PINGSESSIONMANAGER
RTH12xxx	DBG_RECVCLIENTREPORTS
RTH13xxx	DBG_RUNSESSIONMANAGER
RTH14xxx	DBG_SENDCLIENTCOMMANDS
RTH15xxx	DBG_SENDCLIENTREQUESTS
RTH16xxx	DBG_TERMINATECLIENT
RTI03xxx	XSLTRANSFORM
RTI04xxx	XSR_ADDSCHEMADOC
RTI05xxx	XSR_COMPLETE
RTI06xxx	XSR_REGISTER
RTI07xxx	XSR_REMOVE
RTJ01xxx	SYSTS_CREATE
RTJ02xxx	SYSTS_DROP
RTJ03xxx	SYSTS_ENCRYPT
RTJ04xxx	SYSTS_RESTORE
RTJ05xxx	SYSTS_START
RTJ06xxx	SYSTS_STOP
RTJ07xxx	SYSTS_TAKEOVER
RTJ08xxx	SYSTS_UPDATE
RTJ09xxx	SYSTS_ALTER
RTK01xxx	SQLCAMESSAGE
RTK02xxx	SQLCOLPRIVILEGES
RTK03xxx	SQLCOLUMNS
RTK04xxx	SQLFOREIGNKEYS
RTK05xxx	SQLFUNCTIONCOLS
RTK06xxx	SQLFUNCTIONS
RTK07xxx	SQLGETTYPEINFO
RTK08xxx	SQLPRIMARYKEYS
RTK09xxx	SQLPROCEDURECOLS
RTK10xxx	SQLPROCEDURES
RTK11xxx	SQLSPECIALCOLUMNS
RTK12xxx	SQLSTATISTICS
RTK13xxx	SQLTABLEPRIVILEGES
RTK14xxx	SQLTABLES
RTK15xxx	SQLUDTS
RTL01xxx	ADMIN_COMMAND_DB2

Table 155. Mapping between DSNTIDxx variables and DB2-supplied routines (continued)

DSNTIDxx variable	Stored procedure name
RTL02xxx	ADMIN_COMMAND_DSN
RTL03xxx	ADMIN_COMMAND_UNIX
RTL04xxx	ADMIN_DS_BROWSE
RTL05xxx	ADMIN_DS_DELETE
RTL06xxx	ADMIN_DS_LIST
RTL07xxx	ADMIN_DS_RENAME
RTL08xxx	ADMIN_DS_SEARCH
RTL09xxx	ADMIN_DS_WRITE
RTL10xxx	ADMIN_INFO_HOST
RTL11xxx	ADMIN_INFO_SSID
RTL12xxx	ADMIN_JOB_CANCEL
RTL13xxx	ADMIN_JOB_FETCH
RTL14xxx	ADMIN_JOB_QUERY
RTL15xxx	ADMIN_JOB_SUBMIT
RTL17xxx	ADMIN_TASK_ADD
RTL18xxx	ADMIN_TASK_LIST
RTL19xxx	ADMIN_TASK_REMOVE
RTL20xxx	ADMIN_TASK_STATUS
RTL21xxx	ADMIN_UTL_SCHEDULE
RTL22xxx	ADMIN_UTL_SORT
RTL23xxx	ADMIN_TASK_CANCEL
RTL24xxx	ADMIN_TASK_OUTPUT
RTL25xxx	GET_CONFIG
RTL26xxx	GET_MESSAGE
RTL27xxx	GET_SYSTEM_INFO
RTL28xxx	ADMIN_INFO_SYSPARM
RTL29xxx	WLM_SET_CLIENT_INFO
RTL30xxx	ADMIN_UTL_EXECUTE
RTL31xxx	ADMIN_UTL_MODIFY
RTL32xxx	ADMIN_UTL_MONITOR
RTL33xxx	DSN_WLM_APPLENV
RTL34xxx	ADMIN_TASK_UPDATE
RTL35xxx	ADMIN_INFO_SMS
RTL36xxx	ADMIN_INFO_SQL
RTL37xxx	ADMIN_INFO_SYSLOG
RTL38xxx	ADMIN_UPDATE_SYSPARM
RTL40xxx	SET_PLAN_HINT
RTL41xxx	ADMIN_COMMAND_MVS
RTM01xxx	DSNAEXP
RTM05xxx	DSNAHVPM

Table 155. Mapping between DSNTIDxx variables and DB2-supplied routines (continued)


DSNTIDxx variable	Stored procedure name
RTN01xxx	DSNACICS
RTN02xxx	DSNAIMS
RTN03xxx	DSNAIMS2
RTO02xxx	MQREAD
RTO03xxx	MQREADALL
RTO04xxx	MQREADALLCLOB
RTO05xxx	MQREADCLOB
RTO06xxx	MQRECEIVE
RTO07xxx	MQRECEIVEALL
RTO08xxx	MQRECEIVEALLCLOB
RTO09xxx	MQRECEIVECLOB
RTO10xxx	MQSEND
RTP01xxx	SOAPHTTPC
RTP02xxx	SOAPHTTPNC
RTP03xxx	SOAPHTTPNV
RTP04xxx	SOAPHTTPV

**Related tasks:**

Migration step 26: Set up DB2-supplied routines  
 Installing DB2-supplied routines during installation

**Related reference:**

Core WLM environments for DB2-supplied routines

 Procedures that are supplied with DB2 (DB2 SQL)

## WLM management of stored procedures

*Workload Manager* (WLM) is a component of z/OS that manages incoming work requests for the operating system and allocates available system resources to meet these requests. DB2 for z/OS uses WLM to allocate workload requests for DB2 stored procedures.

When DB2 receives a request to run a stored procedure, WLM determines whether additional resources are needed to process the request. For example, WLM might determine that a new WLM-managed address space is needed. WLM makes this determination by evaluating whether the work for a service class is meeting the goals that you set. WLM also evaluates whether the work queues are becoming too large. WLM then examines the system resource utilization as part of the algorithm to decide if another address space should be started. In many cases, a sudden increase in incoming work is handled by existing WLM address spaces, and task control blocks (TCBs) remove work from the queues. Consequently, an address space can handle more concurrent stored procedures or user-defined functions than the number that is specified by NUMTCB in the application environment definition.


**Requirement:** All DB2 stored procedures (except native SQL procedures) must run in WLM-managed address spaces.

A *WLM application environment* starts and manages WLM address spaces that are to be used by stored procedures. You can either create your own WLM application environments or use existing ones, and each stored procedure must be assigned to a WLM application environment. You can assign more than one stored procedure to each WLM application environment, but you might want to separate them for various resource management reasons. The stored procedures that are assigned to a WLM application environment do not need to be written in the same high-level language. However, for different performance reasons, you might decide to separate stored procedures into different application environments by language.

You define application environments for stored procedures as part of your WLM service policy. You also need to define a JCL procedure that WLM is to use to start the address spaces. You store this procedure in PROCLIB. The application environment definition in your policy contains the name of this startup procedure in PROCLIB. If too few address spaces are available to meet the policy goal, WLM starts another server address space if the service policy definition allows it.

**Related concepts:**


 [MVS Planning: Workload Management](#)

 [General performance considerations \(DB2 for z/OS Stored Procedures: Through the CALL and Beyond\)](#)

**Related tasks:**

[Setting up a WLM application environment for stored procedures during installation](#)

[Setting up a WLM application environment for stored procedures during migration](#)

 [Setting up and managing Workload Manager \(DB2 for z/OS Stored Procedures: Through the CALL and Beyond\)](#)

 [Setting the priority of stored procedures \(DB2 Administration Guide\)](#)

## Core WLM environments for DB2-supplied routines

Definitions for core WLM environments are provided as recommended initial environments for running DB2-supplied routines. You can use DB2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the DB2-supplied routines that you use.

Use job DSNTIJRW to define each of these environments with the parameters below, including any changes that are applicable to your site. Alternatively, you can use the provided IWMARIN0 ISPF tool to define these environments. These DB2 core WLM environments are intended as a starting point, not as the optimal environments in which to run the DB2-supplied routines. Over time, you will identify routines for your site that function best in a separate WLM environment.

Installation job DSNTIJMV creates an address space procedure for each of the core WLM environments. The WLM environment address space names have the form *ssnmWLMsuffix*, where *ssnm* is the DB2 subsystem name specified on panel DSNTIPM in the SUBSYSTEM NAME field, and *suffix* is a character that differentiates the various WLM environments. Running DSNTIJMV adds these procedures to the system PROCLIB that you specified on panel DSNTIPW in the SYSTEM PROCEDURES field.

In the description of each environment below, the following terms are used:

## NUMTCB

The maximum number of procedures or functions that can run concurrently in the WLM-established stored procedure address space. The NUMTCB setting for the environment is the maximum appropriate setting for at least one of the routines that should be run in that environment. Other routines that run in the environment may tolerate a higher NUMTCB setting.

## APF-authorized

Whether the external module for one or more routines that are recommended to run in the environment must run under control of the z/OS authorized program facility (APF). “Yes” means that all libraries allocated by the STEPLIB DD must be APF-authorized. “No” means that at least one library allocated by the STEPLIB DD is not APF-authorized. Not all routines that are recommended to run in an APF-authorized environment necessarily require APF authorization. ADMIN\_UPDATE\_SYSPARM and DSNTPSMP must run in an environment that is not APF-authorized.

## Special DDs

Any special data sets, libraries, or work files that are required by at least one of the routines that are recommended to run in the environment. These are in addition to the standard requirement of STEPLIB DD.

## WLM environments

### DSNWLM\_DEBUGGER

This environment is appropriate for stored procedures that are provided for the Unified Debugger tool. Job DSNTIJMV creates an address space procedure for DSNWLM\_DEBUGGER that is called DSNWLMD. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMD.

DSNWLM\_DEBUGGER has the following characteristics:

NUMTCB	10
APF-authorized	No
Special DDs:	This DD is optional: <ul style="list-style-type: none"><li>• PSMDEBUG which is commented out in normal use. Uncomment it to activate debug tracing.</li></ul>
Other considerations:	<ul style="list-style-type: none"><li>• This environment might have a high refresh rate when debug diagnostics are activated.</li><li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li></ul>

### DSNWLM\_DSNACICS

This environment is appropriate for DSNACICS, the DB2 CICS transaction invocation stored procedure. Job DSNTIJMV creates an address space procedure for DSNWLM\_DSNACICS that is called DSNWLMD. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMD.

DSNWLM\_DSNACICS has the following characteristics:

NUMTCB	40
--------	----

APF-authorized	Yes
Special DDs:	This DD is optional: <ul style="list-style-type: none"> <li>• DSNNDUMP, which is commented out in normal use. Uncomment it to cause DSNACICS to generate an SVC dump when DSNACICS will generate an error message. When this DD is used, allocate it to output class for system dumps.</li> </ul>
Other considerations:	<ul style="list-style-type: none"> <li>• The CICS SDFHEXCI library must be allocated by the STEPLIB DD.</li> <li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li> </ul>

### DSNWLM\_GENERAL

This environment is appropriate for most DB2-supplied routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_GENERAL that is called DSNWLMG. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMG.

DSNWLM\_GENERAL has the following characteristics:

NUMTCB	40
APF-authorized	Yes
Special DDs:	None
Other considerations:	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_JAVA

This environment is appropriate for most DB2-supplied Java routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_JAVA that is called DSNWLMJ. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMJ.

DSNWLM\_JAVA has the following characteristics:

NUMTCB	5
APF-authorized	No
Special DDs:	These DDs are required: <ul style="list-style-type: none"> <li>• JAVAENV allocates a data set that contains Language Environment run time options for Java stored procedures. The presence of this DD statement indicates to DB2 that the WLM environment is for Java routines. For an interpreted Java routine, this data set must contain the environment variable JAVA_HOME. This environment variable indicates to DB2 that the WLM environment is for interpreted Java routines. JAVA_HOME also specifies the highest-level directory in the set of directories that contain the Java SDK.</li> <li>• JSPDEBUG allocates a data set in which Language Environment puts run time diagnostics.</li> </ul>

Example:

```
//JAVAENV DD DISP=SHR,DSN=WLMIJAV.JSPENV
//JSPDEBUG DD SYSOUT=*
```

Other considerations:	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.
-----------------------	--



### DSNWLM\_MQSERIES

This environment is appropriate for running DB2 MQSeries functions. Job DSNTIJMV creates an address space procedure for DSNWLM\_MQSERIES that is called DSNWLMM. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMM.

DSNWLM\_MQSERIES has the following characteristics:

NUMTCB	10
APF-authorized	No
Special DDs:	None
Other considerations:	<ul style="list-style-type: none"><li>MQSeries run time libraries must be allocated by the STEPLIB DD if they are not included in the system link list. Example:<pre>//STEPLIB DD DISP=SHR,DSN=prefix.RUNLIB.LOAD //          DD DISP=SHR,DSN=prefix.SCEERUN //          DD DISP=SHR,DSN=prefix.SDSNEXIT //          DD DISP=SHR,DSN=prefix.SDSNLOAD /** Uncomment the following if not included in the LINKLIST /**      DD DISP=SHR,DSN=prefix.SCSQLOAD /**      DD DISP=SHR,DSN=prefix.SCSQAUTH /**      DD DISP=SHR,DSN=prefix.SCSQANL</pre></li><li>The STEPLIB DD must include DSN=prefix.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li></ul>

### DSNWLM\_NUMTCB1

This environment is for DB2-supplied routines that must run serially. If a routine must run serially, it cannot share a task control block (TCB) with another routine. Routines that should run in this environment require a maximum TCB setting of 1 but have no other special DD requirements. Job DSNTIJMV creates an address space procedure for DSNWLM\_NUMTCB1 that is called DSNWLM1. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLM1.

DSNWLM\_NUMTCB1 has the following characteristics:

NUMTCB	1
APF-authorized	Yes
Special DDs:	None
Other considerations:	The STEPLIB DD must include DSN=prefix.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_PGM\_CONTROL

This environment is appropriate for DB2-supplied routines that are registered to RACF program control or an equivalent and can therefore be loaded only with other similar routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_PGM\_CONTROL that is called DSNWLMP. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMP.

DSNWLM\_PGM\_CONTROL has the following characteristics:

NUMTCB	40
--------	----

| APF-authorized Yes  
| Special DDs: None  
| Other The STEPLIB DD must include DSN=*prefix*.SDSNEXIT or other library  
| considerations: where the authorization exit modules (DSN3@ATH and DSN3@SGN)  
| reside.  
|

| **DSNWLM\_REXX**

| This environment is primarily appropriate for the  
| ADMIN\_UPDATE\_SYSPARM and DSNTPSMP stored procedures. However, it  
| can be shared with the other DB2-supplied REXX stored procedures:  
| DSNTBIND, ADMIN\_COMMAND\_DSN, and ADMIN\_INFO\_SYSLOG. Job  
| DSNTIJMV creates an address space procedure for DSNWLM\_REXX that is  
| called DSNWLMR. The name and library name of this procedure change  
| according to the DB2 subsystem name that is specified on panel DSNTIPM. For  
| example, if the subsystem name is VA1A, the procedure is named  
| VA1AWLMR.  
|

| DSNWLM\_REXX has the following characteristics:

| NUMTCB 1  
| APF-authorized No  
|

Special DDs:

These DDs are required:

- SYSEXEC allocates the *prefix*.SDSNCLST library. This data set is where the DB2-supplied REXX routines reside.
- SYSTSPRT allocates an output data destination for messages from the TSO/E command processor.
- SQLDBRM allocates the data set for DBRMs created by running the DSNTPSMP stored procedure, and for DBRMs of packages that are bound by running the DSNTPSMP and DSNTBIND stored procedures.
- SQLCSRC allocates the data set for storing generated C code created by running DSNTPSMP.
- SQLLMOD allocates the data set for storing load modules created by running DSNTPSMP.
- SQLLIBC allocates C header files used by DSNTPSMP for compiling SQL procedures.
- SQLLIBL allocates include files used by DSNTPSMP for link editing external modules for SQL procedures.
- SYSMSGs allocates the message file for the IBM Language Environment pre-link editor.
- CFGTPSMP (optional) allocates a site-provided sequential data set or member, used to define customized operation of DSNTPSMP in this application environment.
- SQLSRC allocates a work file that is used by DSNTPSMP. This work file needs to have a fixed block record format, a logical record length of 80, and a block size of 23440.
- SQLPRINT allocates a work file that is used by DSNTPSMP. This work file needs to have a variable block record format, a logical record length of 137, and a block size of 23476.
- SQLTERM allocates a work file that is used by DSNTPSMP. This work file needs to have a variable block record format, a logical record length of 137, and a block size of 23476.
- SQLOUT allocates a work file that is used by DSNTPSMP. This work file needs to have a variable block record format, a logical record length of 137, and a block size of 23476.
- SQLCPRT allocates a work file that is used by DSNTPSMP. This work file needs to have a variable block record format, a logical record length of 137, and a block size of 23476.
- SQLUT1 allocates a work file that is used by DSNTPSMP. This work file needs to have a fixed block record format, a logical record length of 80, and a block size of 23440.
- SQLUT2 allocates a work file that is used by DSNTPSMP. This work file needs to have a fixed block record format, a logical record length of 80, and a block size of 23440.
- SQLCIN allocates a work file that is used by DSNTPSMP. Do not specify a DCB for allocating this work file.
- SQLLIN allocates a work file that is used by DSNTPSMP. This work file needs to have a fixed block record format, a logical record length of 80, and a block size of 3200.
- SYSMOD allocates a work file that is used by DSNTPSMP. This work file needs to have a fixed block record format, a logical record length of 80, and a block size of 23440.
- SQLDUMMY is required, but must be allocated to DUMMY.
- ZPMDFLT allocates a library member that contains the names of data sets that are used by ADMIN\_UPDATE\_SYSPARM. ADMIN\_UPDATE\_SYSPARM dynamically allocates and deallocates these data sets.

- Other considerations:
- The TSO/E DYNAMNBR parameter must indicate the number of system resources the system should hold for possible reuse.
  - The STEPLIB DD must allocate at least one library that is not APF-authorized.
  - The STEPLIB DD must include *DSN=prefix.SDSNEXIT* or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_UTILS

This environment is appropriate for DB2 utilities stored procedures, which require special DD allocations. These routines require a maximum NUMTCB setting of 1. Job DSNTIJMV creates an address space procedure for DSNWLM\_UTILS that is called DSNWLMU. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMU.

DSNWLM\_UTILS has the following characteristics:

- |                |                         |
|----------------|-------------------------|
| NUMTCB         | 1                       |
| APF-authorized | Yes                     |
| Special DDs:   | These DDs are required: |
- UTPRINT allocates a data set for messages from the sort program.
  - RNPRIN01 allocates a data set for messages from the sort program. This DD is required only if you plan to invoke RUNSTATS and collect distribution statistics.
  - STPRIN01 allocates a data set for messages from the sort program. This DD is required when a utility is directed to collect frequency statistics on at least one data-partitioned secondary index or when TABLESPACE TABLE COLGROUP FREQVAL is specified.
  - DSSPRINT allocates a data set for messages when making concurrent copies.
  - SYSIN allocates a work file for temporarily storing utility input statements
  - SYSPRINT allocates a work file for temporarily storing utility output messages.

Example:

```
//UTPRINT DD SYSOUT=*
//RNPRIN01 DD SYSOUT=*
//STPRIN01 DD SYSOUT=*
//DSSPRINT DD SYSOUT=*
//SYSIN DD UNIT=SYSDA,SPACE=(4000,(20,20),,,ROUND)
//SYSPRINT DD UNIT=SYSDA,SPACE=(4000,(20,20),,,ROUND)
```

- Other considerations: The STEPLIB DD must include *DSN=prefix.SDSNEXIT* or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_WEBSERVICES

This environment is appropriate for running DB2 web services and SOAP functions. Job DSNTIJMV creates an address space procedure for DSNWLM\_WEBSERVICES that is called DSNWLMW. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMW.

DSNWLM\_WEBSERVICES has the following characteristics:

NUMTCB	10
APF-authorized	No
Special DDs:	This DD is required: <ul style="list-style-type: none"> <li>• WSERROR allocates an HFS file for diagnostic output from the DB2 web services functions.</li> </ul>
	Example: <pre>//WSERROR DD PATH='/tmp/wsc.err', //          PATHOPTS=(ORDWR,OCREAT,OAPPEND), //          PATHMODE=(SIRUSR,SIWUSR,SIRGRP, //          SIWGRP,SIROTH,SIWOTH)</pre>
	Ensure that "PATH" specifies a valid path name and that the specified directory structure exists.
Other considerations:	<ul style="list-style-type: none"> <li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li> <li>• The default timeout to read data from WS provider is 2 seconds. If you need to increase the timeout value, redefine the UDFs with the following run time options: <pre>RUN OPTIONS 'POSIX(ON),XPLINK(ON),ENVAR("DB2SOAP_TIMEOUT=X")'</pre> </li> </ul> <p>where X is a number that specifies the timeout value in seconds.</p>

#### DSNWLM\_XML

This environment is appropriate for DB2-supplied XML processing routines that require large amounts of memory. Job DSNTIJMV creates an address space procedure for DSNWLM\_XML that is called DSNWLMX. The name and library name of this procedure change according to the DB2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMX.

DSNWLM\_XML has the following characteristics:

NUMTCB	40
APF-authorized	Yes
Special DDs:	None
Other considerations:	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

#### Related concepts:

Configuration control statements for DB2-supplied routines

#### Related tasks:

Setting up a WLM application environment for stored procedures during installation

Setting up a WLM application environment for stored procedures during migration

## DSNTWLMB tool

The DSNTWLMB tool provides a batch interface for defining, installing, and activating WLM environments. This tool is invoked by job DSNTIJRW to create the core DB2 WLM environments.

## Authorization

If the RACF facility class is active and a profile has been defined for the MVSADMIN.WLM.POLICY facility class, the user of this tool needs the following access:

- ACCESS(READ) for action WLMINFO  
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
- ACCESS(UPDATE) for action ADD, ADD\_ACTIVATE, ACTIVATE  
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(UPDATE)

## Parameter descriptions

The batch program accepts the following parameters:

### **ACTION**(*action-type*)

Identifies the type of action that is to be performed. This parameter is required and it supports the following values:

#### **ACTIVATE**

The batch program activates a WLM service policy.

#### **ADD**

The batch program installs a new WLM application environment to an existing WLM service definition without activating a service policy. The new WLM application environment becomes available on the next activation of a WLM policy.

#### **ADD\_ACTIVATE**

The batch program installs a new WLM application environment to an existing WLM service definition and activates a WLM service policy to enable the new WLM application environment.

#### **WLMINFO**

The batch program queries the existing WLM service definition and returns basic information.

### **POLICY**(*policy-ID*)

Identifies the WLM service policy that is to be activated. This parameter is required if any of the following actions are specified:

- ACTIVATE
- ADD\_ACTIVATE

The service policy ID can be 1 – 8 characters or “ACTIVE”. If “ACTIVE” is specified as the policy ID, the current active service policy is used.

## SYSIN parameters

If the specified action is ADD or ADD\_ACTIVATE, additional input is required from SYSIN to provide details about the WLM environment that is to be installed. The additional information can be entered from the SYSIN DD statement. The parameters can be entered on one line (up to 72 characters per line) or multiple lines, and they should be separated by one or more spaces.

The following parameters are supported under SYSIN DD:

### **WLMNAME**(*name*)

The defined name for an application environment. The name can be 1 – 32 characters and cannot begin with “SYS”. This is a required parameter.

| **DESCRIPTION**(*description*)

| A 32 character area that describes the application environment. This parameter  
| can be set to an empty value. For example:

| DESCRIPTION()

| **PROCNAME**(*procedure-name*)

| Defines the JCL procedure that WLM uses to start server address spaces for the  
| application environment. This is a required parameter.

| **STARTPARM**(*start-up-parameters*)

| Contains the parameters that WLM uses to start the JCL procedure. The  
| parameters can be up to 115 characters, or it can be set to an empty value. If  
| the parameters include the subsystem name, you can use the symbol  
| &IWMSSNM to cause WLM to substitute the subsystem name instead of  
| directly typing the subsystem name. This is useful because multiple instances  
| of the subsystem with different names can use the application environment.  
| For example:

| STARTPARM(DB2SSN=&IWMSSNM,APPLENV=WLMENV1,NUMTCB=1)

| **WLMOPT**(WLM\_MANAGED|SINGLE\_SERVER)

| Tells WLM whether it should limit the number of server address spaces that  
| are created. For a single system, the WLM\_MANAGED option means that any  
| number of servers can be created for the subsystem on the system where it is  
| connected to Workload Manager. In a sysplex, WLM\_MANAGED means that  
| servers can be created for the subsystem on any number of systems in the  
| sysplex. If multiple DB2 subsystems are on a system, WLM will create one  
| server for each DB2 subsystem that calls the routines.

| The SINGLE\_SERVER option means that only one address space can exist per  
| system. For DB2-supplied routines, you can set a limit of one address space  
| per system if this limit is required by the routine. For example, if a server  
| address space requires exclusive use of a resource, only a single address space  
| can exist. Use this option if a stored procedure cannot execute concurrently in  
| multiple address spaces. This option should be used if a stored procedure is to  
| be run in debug mode and writes to a trace. A limit of one address space per  
| sysplex does not apply to DB2-supplied routines.

| This parameter can be set to an empty value and will default to  
| WLM\_MANAGED.

| **Related tasks:**

| Setting up a WLM application environment for stored procedures during migration

| Setting up a WLM application environment for stored procedures during  
| installation

| **Sample SQL statements for installing DB2-supplied routines**

| Sample member DSNTESR contains the data definition language that is used by  
| job DSNTIJRT.

| DSNTIJRT uses the full template data definition language to create DB2-supplied  
| routines and supporting objects, and bind statements for creating related packages.  
| In earlier versions of DB2, the data definition language for creating and granting  
| access to DB2-supplied routines and related objects, and the commands for binding  
| packages, was provided as in-stream input processed by a number of installation  
| jobs. In DB2 10, those statements are removed, but DSNTESR enables users to view

the full SQL statements if necessary. In DSNTESR, if a routine has a package, the command to bind that package appears immediately after the CREATE statement from that routine.

## Configuration control statements for DB2-supplied routines

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that DB2 supplies.

Configuration control statements consist of a routine's schema and name (for stored procedures) or specific name (for user-defined functions), followed by customizable parameters. You can manually customize these parameters, but to save your settings and facilitate future migrations, specify changes using the DB2 routines: Advanced configuration options installation panels, which are accessed from the DSNTIPR1 panel.

### Parameters

The following parameters are used in configuration control statements:

#### WLMENV

The name of the WLM environment for running the routine. The default environment depends on the routine.

#### GRANTTO

The authorization IDs allowed to execute the routine and use any associated tables or created global temporary tables. Separate multiple IDs with commas. Do not use blanks. The default is PUBLIC, which allows everyone to execute the routine.

#### PKGOWNER

The authorization ID to own the routine's package. The specified owner must have the privileges required to execute the SQL statements contained in the routine. If this parameter is specified for a routine that does not have a package, the parameter is ignored. If this optional parameter is not specified, the default package owner is the primary ID used to run DSNTRIN.

### Statement format

The general form of a configuration control statement is:

```
schema.routine-name  
WLMENV(wlm-environment-name)  
GRANTTO(auth-ID1, ..., auth-IDn)  
PKGOWNER(package-owner)
```

### Statement rules

The following rules apply to configuration control statements:

- Statements must reside in records having a fixed-block record format with a logical record length of 80 (same as JCL).
- Only columns 1 - 72 of each record are inspected. Columns 73 - 80 are ignored.
- Statement elements are delimited by one or more blank characters.
- Statement elements cannot contain embedded blanks.
- Statements are delimited by one or more blank lines.
- A statement can be continued on multiple input records. A statement element can be continued by breaking it at column 72 of one record and resuming it at column 1 of the next record.



- An asterisk in column 1 of a record indicates a comment line and the content is ignored.
- Comment lines cannot begin after column 1.
- Comments and statement elements cannot be on the same line.
- Comment lines can be embedded within a statement.
- The routine must be specified as the schema name followed by a period and the routine name.
- The WLMENV parameter is required and must directly follow the *schema.routine name*.
- The GRANTTO parameter is required and must directly follow the WLMENV parameter.
- The PKGOWNER parameter is optional. If specified, it must follow the GRANTTO parameter.

## Examples

The following examples are valid configuration control statements:

```
* Configuration statements for the Utilities stored procedures follow:
SYSPROC.DSNUTILS
WLMENV(WLMENV_DSNUTIL)
*
* A comment line within the statement is legal
*
  GRANTTO(PUBLIC)
  PKGOWNER(ALFA)

* Notice the all-blank line above to delineate the two statements
SYSPROC.DSNUTILU
  WLMENV(WLMENV_DSNUTIL)
*
* Here is an example of wrapping an element to the next line
  GRANTTO(ALFA,BRAVO,CHARLIE,DELTA,ECHO,FOXTROT,GOLF,HOTEL,INDIA,JULIETT
E,KILO,LIMA)
*
* PKGOWNER is commented-out below so the OWNER parm will be excluded
*   from the BIND PACKAGE statement
* PKGOWNER(ALFA)
```

The following examples are invalid configuration control statements that violate the statement rules:

```
* Configuration statement for the WLM refresh stored procedure follows:
* - Error 1: The statement must start with schema.routine-name
WLM_REFRESH
* - Error 2: Comments can't start after column 1
* This is not a valid comment
* - Error 3: Comments and elements can't be in the same line
  WLMENV(WLMENV_APFAUTH) * This is an invalid place to put a comment
* - Error 4: GRANTTO argument contains blanks
  GRANTTO( ALFA, BRAVO, CHARLIE, DELTA, ECHO, FOXTROT )
* - Error 5: PKGOWNER is present but has no argument
  PKGOWNER()
*
* - Error 6: The statements are not separated by a blank line
SYSPROC.DSNTPSMP
* - Error 7: The statement does not have a WLMENV parm
* - Error 8: The statement contains a blank line

  GRANTTO(HOTEL)
```

**Related reference:**

Core WLM environments for DB2-supplied routines

## Disabling DB2-supplied routines for validation

Job DSNTIJRT installs all DB2-supplied routines on your subsystem. After installation or migration, you can disable any routines that are unnecessary or unusable so the validation program can exclude it from processing.

### Procedure

To disable a DB2-supplied routine:

Assign DSNWLM\_NOT\_ENABLED as the WLM environment of the routine. The DSNTRVfy validation program does not validate routines that are defined with DSNWLM\_NOT\_ENABLED as the WLM environment name.

### Example

For example, if CICS is not installed, assign DSNWLM\_NOT\_ENABLED as the WLM environment of SYSPROC.DSNACICS by using the following statement:

 **GUPI**

```
ALTER PROCEDURE SYSPROC.DSNACICS WLM ENVIRONMENT DSNWLM_NOT_ENABLED
```

 **GUPI**

## Setting up support for external SQL procedures

If you plan to create external SQL procedures by using DSNTPSMP or IBM Data Studio, you need to complete some additional setup. Alternatively, you can write your own JCL to create external SQL procedures, in which case you do not need to perform this setup.

### About this task

DSNTPSMP is a REXX stored procedure that you can use to create and prepare external SQL procedures. DSNTPSMP is also used by IBM Data Studio to create external SQL procedures. When DSNTPSMP is invoked, DB2 uses the DSNTPSMP REXX EXEC, which is in the *prefix.SDSNCLST* data set.

### Procedure

To set up support for external SQL procedures:

1. If DSNTPSMP does not already exist, run job DSNTIJRT to create this stored procedure.
2. Install DB2 REXX Language Support.
3. Set up a WLM environment in which to run DSNTPSMP and create a WLM startup procedure.

**Recommendation:** If you do not have a WLM environment defined to run DSNTPSMP, use the core WLM environment DSNWLM\_REXX.

### Related concepts:


Job DSNTIJRT

### Related tasks:

Installation step 16: Create default storage group, define temporary work files, and bind DB2 REXX Language Support: DSNTIJTM

Setting up a WLM application environment for stored procedures during installation

Setting up a WLM application environment for stored procedures during migration

 [Creating an external SQL procedure \(DB2 Application programming and SQL\)](#)

### Related reference:

Core WLM environments for DB2-supplied routines

## Additional steps for enabling the stored procedures and objects for XML schema support

DB2 for z/OS provides several stored procedures that you can call in your application programs to perform XML schema registration and removal.

### Before you begin

#### GUPI

Before you complete this step, set up WLM application environments for the stored procedures for XML support, and either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation.

### About this task

DB2 provides the following stored procedures for XML schema support:

- SYSPROC.XSR\_REGISTER
- SYSPROC.XSR\_ADDSCHEMADOC
- SYSPROC.XSR\_COMPLETE
- SYSPROC.XSR\_REMOVE

DB2 provides the following tables for XML schema support:

- SYSIBM.XSRANNOTATIONINFO
- SYSIBM.XSRCOMPONENT
- SYSIBM.XSROBJECTCOMPONENTS
- SYSIBM.XSROBJECTHIERARCHIES
- SYSIBM.XSROBJECTGRAMMAR
- SYSIBM.XSROBJECTPROPERTY
- SYSIBM.XSROBJECTS
- SYSIBM.XSRPROPERTY

### Procedure

To enable the stored procedures and objects for XML schema support:

Install Java support.

The XSR\_COMPLETE stored procedure is a Java stored procedure and therefore requires Java support.

| **Related concepts:**

| Support for Java


| Job DSNTIJRT

| **Related reference:**

| Core WLM environments for DB2-supplied routines

| XML processing routines panel: DSNTIPRI

| **Related information:**

|  Procedures for XML schema registration and removal that are supplied with DB2 (DB2 Programming for XML)

| **Additional steps for enabling the function for XSLTRANSFORM routines support**

| DB2 for z/OS provides a function that you can call in your application programs to transform XML documents with XSL transformation processing.

| **Before you begin**

|  **GUIP**

| Before you complete this step, set up WLM application environments for Java routines, and either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation.

| **About this task**

| DB2 provides the following function for XSL transform support:

- SYSFUN.XSLTRANSFORM

| **Procedure**

| To enable the user-defined function for XSL transformation support:

| Install Java support.

| The XSLTRANSFORM function is a Java stored procedure and therefore requires Java support.

| **Related concepts:**

| Support for Java

| Job DSNTIJRT

| **Related reference:**

| Core WLM environments for DB2-supplied routines

| XML processing routines panel: DSNTIPRI

| **Additional steps for enabling the administrative task scheduler and administrative enablement routines**

| The administrative task scheduler routines are DB2-supplied routines that enable you to schedule work. The administrative enablement routines are DB2-supplied routines that enable you to execute administrative work immediately.

## Before you begin

Before you complete these steps, set up WLM application environments for the administrative task scheduler and administrative enablement routines, and either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation.

**Recommendation:** If you do not have a WLM environment defined to run these routines, use DB2 core WLM environment DSNWLM\_GENERAL, except as follows:

- ADMIN\_COMMAND\_DSN - Use DSNWLM\_REXX
- ADMIN\_COMMAND\_UNIX - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_INFO\_SYSLOG - Use DSNWLM\_REXX
- ADMIN\_INFO\_SYSPARM - Use DSNWLM\_NUMTCB1
- ADMIN\_JOB\_CANCEL - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_FETCH - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_QUERY - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_SUBMIT - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_UPDATE\_SYSPARM - Use DSNWLM\_REXX
- ADMIN\_UTL\_MONITOR - Use DSNWLM\_PGM\_CONTROL

## About this task

The following routines are administrative task scheduler routines:

- ADMIN\_TASK\_ADD
- ADMIN\_TASK\_CANCEL
- ADMIN\_TASK\_LIST
- ADMIN\_TASK\_OUTPUT
- ADMIN\_TASK\_REMOVE
- ADMIN\_TASK\_STATUS
- ADMIN\_TASK\_UPDATE

The following routines are administrative enablement routines:

- ADMIN\_COMMAND\_DB2
- ADMIN\_COMMAND\_DSN
- ADMIN\_COMMAND\_MVS
- ADMIN\_COMMAND\_UNIX
- ADMIN\_DS\_BROWSE
- ADMIN\_DS\_DELETE
- ADMIN\_DS\_LIST
- ADMIN\_DS\_RENAME
- ADMIN\_DS\_SEARCH
- ADMIN\_DS\_WRITE
- ADMIN\_INFO\_HOST
- ADMIN\_INFO\_SMS
- ADMIN\_INFO\_SQL
- ADMIN\_INFO\_SSID
- ADMIN\_INFO\_SYSLOG

- ADMIN\_INFO\_SYSPARM
- ADMIN\_JOB\_CANCEL
- ADMIN\_JOB\_FETCH
- ADMIN\_JOB\_QUERY
- ADMIN\_JOB\_SUBMIT
- ADMIN\_UPDATE\_SYSPARM
- ADMIN\_UTL\_EXECUTE
- ADMIN\_UTL\_MODIFY
- ADMIN\_UTL\_MONITOR
- ADMIN\_UTL\_SCHEDULE
- ADMIN\_UTL\_SORT

As part of the installation and migration process, job DSNTIJRT defines, binds, and grants access to these DB2-supplied routines.

## Procedure

To enable the administrative task scheduler and administrative enablement routines:

1. In the JCL for starting the WLM-established address space for running the stored procedures whose load module must reside in an APF-authorized library, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.
2. Take the following steps, which are required because the started task module, DSNADMT0, of the administrative task scheduler switches users by using the pthread\_security\_np() function of z/OS UNIX System Services:
  - a. Ensure that the started task user (STARTUID) has READ access to the BPX.SERVER FACILITY class profile by taking the action that is recommended in the following table. The action that you take depends on whether the BPX.SERVER is defined and whether the STARTUID is a superuser.

*Table 156. Ensuring that the STARTUID has READ access to the BPX.SERVER FACILITY class profile*

Is the BPX.SERVER in FACILITY class defined?	Is the STARTUID a superuser?	Actions to take
No	No	1. Define the BPX.SERVER class profile in the FACILITY class.  2. Permit STARTUID READ access to this profile.
No	Yes	No action required
Yes	n/a	Permit STARTUID READ access to resource profile BPX.SERVER in the FACILITY class.


- b. Ensure that the scheduler program is program controlled by taking one of the following actions:
  - Define the scheduler program to RACF program control, by customizing and running job step DSNADSR in job DSNTIJRA.

- Define the BPX.DAEMON.HFSCTL class profile in the FACILITY class, and permit STARTUID READ access to this profile.
3. If the BPX.DAEMON facility class is active and the BPX.DAEMON.HFSCTL facility class is not defined, perform the following actions for the stored procedures that must be registered to RACF program control. The stored procedures that require RACF program control are:
    - ADMIN\_COMMAND\_UNIX
    - ADMIN\_JOB\_CANCEL
    - ADMIN\_JOB\_FETCH
    - ADMIN\_JOB\_QUERY
    - ADMIN\_JOB\_SUBMIT
    - a. Customize and run job step DSNADER in job DSNTIJRA to define the security environment for these stored procedures. You need to uncomment job step DSNADER before you run job DSNTIJRA. You do not need to run any other job steps in job DSNTIJRA.
    - b. Ensure that you have a WLM environment for these stored procedures that meets the following requirements:
      - The WLM-established stored procedure address space loads only controlled programs.
      - In the JCL for starting the WLM-established address space for running these stored procedures, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.
      - The name of this environment must match the WLMENV parameter value in the configuration control statement for each stored procedure in job DSNTIJRT.
  4. Ensure that the BPX.CONSOLE resource in the FACILITY class is defined, and grant users READ access to the resource by issuing the following RACF commands:
 

```
PERMIT BPX.CONSOLE ID(user-id) ACCESS(READ) CLASS(FACILITY)
SETROPTS RACLIST(FACILITY) REFRESH
```

where *user-id* is the caller of the ADMIN\_UPDATE\_SYSPARM stored procedure. This step is required for ADMIN\_UPDATE\_SYSPARM, which uses the \_console() function.

**Related reference:**

-  Procedures that are supplied with DB2 (DB2 SQL)
- Core WLM environments for DB2-supplied routines
- DB2 administration routines panel: DSNTIPRL

## Additional steps for enabling the CICS transaction invocation procedure

The CICS transaction invocation stored procedure, DSNACICS, invokes CICS server programs.

### Before you begin

Before you complete these steps, either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation.

## Procedure

To enable the CICS transaction invocation procedure:

1. Optional: Set up a WLM application environment specifically for running DSNACICS.

Although DSNACICS can run in a WLM address space with other stored procedures, DSNACICS performs better if it runs in its own address space.

**Recommendation:** If you do not have a WLM environment defined to run this routine, use DB2 core WLM environment DSNWLM\_CICS.

2. Create or modify the JCL startup procedure for the stored procedure address space for running DSNACICS.

If you ran installation job DSNTIJMV, such a sample startup procedure has been created in your SYS1.PROCLIB data set. The generic name of the procedure is DSNWLMC. The CICS data set names in the procedure are based on the values that you specified on panel DSNTIPW. If needed, you can modify this startup procedure.


If you did not run installation job DSNTIJMV or the part of it that creates this startup procedure, run the job now. You can also use the sample startup procedure in the job as a model to create your own startup procedure.

### Related concepts:

Job DSNTIJRT

### Related tasks:


Migration step 13: Define DB2 10 to z/OS: DSNTIJMV

 [Assigning stored procedures and functions to WLM application environments \(DB2 Performance\)](#)

### Related reference:

Core WLM environments for DB2-supplied routines

DSNTIPW: Data set names panel 3

 [DSNACICS stored procedure \(DB2 SQL\)](#)

## Additional steps for enabling the DSNAEXP EXPLAIN stored procedure

The DSNAEXP stored procedure can be used to issue EXPLAIN on SQL statements without needing the authority to issue the SQL statements.

### Before you begin

Before you complete these steps, either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation. Although DSNAEXP can run in an address space with other stored procedures, DSNAEXP performs better if it runs in its own address space. Therefore, you should set up a WLM application environment and startup procedure specifically for running DSNAEXP.

### About this task


#### Procedure

To enable the DSNAEXP EXPLAIN stored procedure:



Define a PLAN\_TABLE for each user. See member DSNTESC in *prefix.SDSNSAMP* for sample SQL statements.

**Related tasks:**

 Assigning stored procedures and functions to WLM application environments (DB2 Performance)

## Additional steps for enabling the common SQL API stored procedures

You can use the common SQL API stored procedures to retrieve information about the data server configuration, the short message text for an SQL code, and system information. These stored procedures are used primarily by tools.

### Before you begin

Before you complete these steps, either install the DB2-supplied routines during migration or install the DB2-supplied routines during installation. To create the GET\_CONFIG stored procedure with the correct security attributes, job DSNTIJRT must be run by a user ID with SYSOPR and MONITOR1 privileges.

Job DSNTIJRT installs and configures these stored procedures, but you must complete additional steps before you use them.

If GET\_SYSTEM\_INFO will be called to return the ICF catalog information about DB2 data sets, the user who defines the stored procedure must have MONITOR1 and DISPLAY privileges. If GET\_SYSTEM\_INFO will be called to return catalog attributes or ICF catalog information about DB2 data sets, the user who defines the stored procedure must have READ access to the OPERCMDS resource MVS.MCSOPER.DSNADMGS. If MVS.MCSOPER.DSNADMGS does not exist, the user must have READ access to the OPERCMDS resource MVS.MCSOPER.\*. Otherwise, catalog attributes information will not be returned from GET\_SYSTEM\_INFO. To give the user that defines the procedures access to the RACF OPERCMDS class, the RACF security administrator must:

1. If the OPERCMDS class is not active, issue the following SETROPTS command to activate the OPERCMDS class:

```
SETROPTS CLASSACT(OPERCMDS)
```

2. If the generic profile for OPERCMDS is not active, issue the following SETROPTS command to activate it:

```
SETROPTS GENERIC(OPERCMDS)
```

3. Issue the RDEFINE command to establish a profile for MVS.MCSOPER.*console-name*. In this example, *console-name*=DSNADMGS:

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNADMGS UACC(NONE)
```

4. Give the user ID access to the class. In this example, the user ID is USER001:

```
PERMIT MVS.MCSOPER.DSNADMGS CLASS(OPERCMDS) ID(USER001) ACCESS(READ)
```

5. Issue the SETROPTS RACLIST command to refresh the OPERCMDS reserve class:

```
SETROPTS RACLIST(OPERCMDS) REFRESH
```

Before you complete the additional steps to enable the common SQL API stored procedures, set up WLM application environments for them to run in. These stored procedures run in WLM-established stored procedures address spaces.

The common SQL API stored procedures are:

- SYSPROC.GET\_CONFIG
- SYSPROC.GET\_MESSAGE
- SYSPROC.GET\_SYSTEM\_INFO
- SYSPROC.SET\_PLAN\_HINT

GET\_SYSTEM\_INFO must run in a separate WLM environment from DSNUTILS or DSNUTILU.

### Procedure

To enable the common SQL API stored procedures:

In the JCL for starting the WLM-established address space for running the GET\_SYSTEM\_INFO stored procedure, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.

### What to do next

**Restriction:** To run the GET\_CONFIG and GET\_SYSTEM\_INFO stored procedures, DB2 must be started with subsystem parameters of LOBVALA=4096 KB or higher and LOBVALS=4096 MB or higher.


#### Related concepts:

 [Common SQL API stored procedures \(DB2 Administration Guide\)](#)

#### Related reference:

 [GET\\_CONFIG stored procedure \(DB2 SQL\)](#)

 [GET\\_MESSAGE stored procedure \(DB2 SQL\)](#)

 [GET\\_SYSTEM\\_INFO stored procedure \(DB2 SQL\)](#)

 [SET\\_PLAN\\_HINT stored procedure \(DB2 SQL\)](#)

## Additional steps for enabling WebSphere MQ user-defined functions

Before applications can call the WebSphere MQ user-defined functions, you must enable the user-defined functions.

### Before you begin

If you want to use the MQI-based MQ functions, you must install WebSphere MQ Version 6 or later.

### About this task

The MQ functions in the DB2MQ1C, DB2MQ2C, DB2MQ1N, and DB2MQ2N schemas are no longer supported because they use AMI, which is no longer supported. These functions are:

- GETCOL
- MQPUBLISH
- MQREAD
- MQREADALL
- MQREADALLCLOB


- MQREADCLOB
- MQRECEIVE
- MQRECEIVEALL
- MQRECEIVEALLCLOB
- MQRECEIVECLOB
- MQSEND
- MQSUBSCRIBE
- MQUNSUBSCRIBE

The schema for the following functions is now DB2MQ.

- MQREAD
- MQREADALL
- MQREADALLCLOB
- MQREADCLOB
- MQRECEIVE
- MQRECEIVEALL
- MQRECEIVEALLCLOB
- MQRECEIVECLOB
- MQSEND

**Related reference:**

 [Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

 [Systems Programmer's Guide to: Workload Manager \(IBM Redbooks\)](#)

 [WebSphere MQ library](#)

**Moving from previous versions of the WebSphere MQ user-defined functions**

During installation or migration, the current versions of some WebSphere MQ user-defined functions are installed under schema DB2MQ by job DSNTIJRT.

**About this task**

The following user-defined functions have new versions:

- MQREAD
- MQREADALL
- MQREADALLCLOB
- MQREADCLOB
- MQRECEIVE
- MQRECEIVEALL
- MQRECEIVEALLCLOB
- MQRECEIVECLOB
- MQSEND

**Recommendation:** Code new applications to use the functions in schema DB2MQ. The functions in schemas DB2MQ1C, DB2MQ2C, DB2MQ1N, and DB2MQ2N are no longer supported.

## Converting from the AMI-based MQ functions to the MQI-based MQ functions

The MQI-based MQ functions use two tables, SYSIBM.MQSERVICE\_TABLE and SYSIBM.MQPOLICY\_TABLE, instead of Application Messaging Interface (AMI) configuration files. You need to bind the new functions, create the tables, and convert the contents of the AMI configuration files to rows in the MQ tables.

### About this task

Job DSNTIJRT binds the new functions and creates the tables. You need to manually convert the contents of the AMI configuration files.

### Procedure

To manually move the AMI configuration file data to the MQ tables:

1. Map sub-elements and attributes under the <ServicePoint> element to columns in SYSIBM.MQSERVICE\_TABLE as indicated in the following table.

Table 157. How elements and attributes under the <ServicePoint> element map to columns in the SYSIBM.MQSERVICE\_TABLE table

Element	Attribute of element	Column	Example
<ServicePoint>	longDescription	DESC_LONG	<ServicePoint longDescription="" shortDescription="" .. xmi.label="DB2.DEFAULT.SERVICE">
	shortDescription	DESC_SHORT	
	xmi.label	SERVICENAME	
<ServicePoint_queueName>	value	INPUTQUEUE	<ServicePoint_queueName .. value="DB2MQ_DEFAULT_Q"/>
<ServicePoint_queueMgrName>	value	QUEUEMANAGER	<ServicePoint_queueMgrName .. value="MQND"/>

2. Map sub-elements and attributes under the <Policy> element to columns in SYSIBM.MQPOLICY\_TABLE as indicated in the following table.

Table 158. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<Policy>	long Description	value	DESC_LONG	value	<Policy longDescription="" shortDescription="" .. xmi.label="DB2.DEFAULT.POLICY">
	short Description		DESC_SHORT		
	xmi.label		POLICYNAME		
<GeneralAttributes_syncpoint>	value	Yes	SYNCPOINT	Y	<GeneralAttributes_syncpoint .. value="Yes"/>
		No		N	
<SendAttributes_priority>	value	AsTransport	SEND_PRIORITY	-1	<SendAttributes_priority .. value="AsTransport"/>
<SendAttributes_persistence>	value	AsTransport	SEND_PERSISTENCE	Q	<SendAttributes_persistence .. value="AsTransport"/>
		Yes		Y	
		No		N	

Table 158. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table (continued)

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<SendAttributes_expires>	value	Unlimited	SEND_EXPIRY	-1	<SendAttributes_expires .. value="Unlimited"/>
<SendAttributes_retryCount>	value	<i>n</i>	SEND_RETRY_COUNT	<i>n</i>	<SendAttributes_retryCount .. value="0"/>
<SendAttributes_retryInterval>	value	<i>n</i>	SEND_RETRY_INTERVAL	<i>n</i>	<SendAttributes_retryInterval .. value="1000"/>
<SendAttributes_newCorrelId>	value	Yes	SEND_NEW_CORRELID	Y	<SendAttributes_newCorrelId .. value="No"/>
		No		N	
<SendAttributes_responseCorrelId>	value	MessageID	SEND_RESPONSE_CORRELID	C	<SendAttributes_responseCorrelId .. value="MessageID"/>
		CorrelID		P	
<SendAttributes_exceptionAction>	value	DLQ	SEND_EXCEPTION_ACTION	Q	<SendAttributes_exceptionAction .. value="DLQ"/>
		Discard		D	
<SendAttributes_reportTypeException>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_EXCEPTIONDESC_LONG	N	<SendAttributes_reportTypeException .. value="No"/>  <SendAttributes_reportData .. value="Report"/>
		Yes, Report		E	
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	
<SendAttributes_reportTypeCOA>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_COA	N	<SendAttributes_reportTypeCOA .. value="No"/>  <SendAttributes_reportData .. value="Report"/>
		Yes, Report		C	
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	
<SendAttributes_reportTypeCOD>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_COD	N	<SendAttributes_reportTypeCOD .. value="No"/>  <SendAttributes_reportData .. value="Report"/>
		Yes, Report		C	
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	
<SendAttributes_reportTypeExpiry>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_EXPIRY	N	<SendAttributes_reportTypeExpiry .. value="No"/>  <SendAttributes_reportData .. value="Report"/>
		Yes, Report		E	
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	
<ReceiveAttributes_waitInterval>	value	<i>n</i>	RCV_WAIT_INTERVAL	<i>n</i>	<ReceiveAttributes_waitInterval .. value="60"/>

Table 158. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table (continued)

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<ReceiveAttributes _convert>	value	Yes	RCV_CONVERT	Y	<ReceiveAttributes _convert .. value="Yes"/>
		No		N	
<ReceiveAttributes _acceptTruncated Messages>	value	Yes	RCV_ACCEPT _TRUNC_MSG	Y	<ReceiveAttributes _acceptTruncated Messages .. value="Yes"/>
		No		N	
<ReceiveAttributes _openShared>	value	Yes	RCV_OPEN _SHARED	S	<ReceiveAttributes _openShared .. value="Yes"/>
		No		E	

**Note:**

1. The two values are used in conjunction to determine the column value.

### Starting the queue manager

To enable WebSphere MQ user-defined functions, start the queue manager after you create and configure the broker domain.

#### Procedure

To start the queue manager:

1. Issue the following command from the z/OS console, where *<command-prefix-string>* is the command prefix string for the WebSphere MQ subsystem.:  
`<command-prefix-string> START QMGR`  
 For example, if the command prefix string for your WebSphere MQ subsystem is -MQND, issue this command:  
`-MQND START QMGR`
2. To check whether the queue manager is available, issue the following command from the TSO Command Processor panel, which is option 6 of the ISPF/PDF primary options menu:  
`CSQOREXX`

### Customizing WLM application environments for running WebSphere MQ user-defined function support


To run WebSphere MQ user-defined functions, you need to set up two different WLM application environments and corresponding WLM startup procedures.

#### About this task

The WLM environments that you must set up are:

- An application environment and startup procedure for running the single-phase commit functions
- An application environment and startup procedure for running the two-phase commit functions

#### Related concepts:

 DB2 MQ functions and DB2 MQ XML stored procedures (DB2 Application programming and SQL)

| **Related reference:**

| Core WLM environments for DB2-supplied routines

| **Verifying the DB2 and WebSphere MQ setup**

| After you set up the WebSphere MQ environment, you can verify that it is set up  
| correctly by running DB2 jobs.

| **Procedure**

| To verify your WebSphere MQ setup:

- | 1. Customize and run job DSNTEJMQ to verify that your WebSphere MQ  
| environment is set up correctly for invoking DB2 WebSphere MQ user-defined  
| functions. Instructions for customizing this job are in the job prolog. Job  
| DSNTEJMQ defines a local queue and invokes each of the WebSphere MQ  
| functions through DSNTEP2.
- | 2. Customize and run jobs DSNTEJSQ and DSNTEJSV to verify that your  
| WebSphere MQ environment is set up correctly for invoking DB2 WebSphere  
| MQ publish/subscribe user-defined functions. Instructions for customizing  
| these jobs are in the job prolog.

| **Enabling DB2 web services**

| *Web services* are sets of business functions that applications or other web servers  
| invoke over the Internet by using standard HTTP or HTTPS requests.

| **Additional steps for enabling web service user-defined functions**

| Enabling the web service user-defined functions allows you to specify a complete  
| SOAP message as input, so you receive the complete SOAP messages from the web  
| service provider's response.

| **Before you begin**

| Before you complete these steps, set up WLM application environments for web  
| service user-defined functions.

| **Recommendation:** For web service functions, use the DSNWLM\_WEBSERVICES  
| core WLM environment.

| **About this task**

| During installation or migration, the following web service user-defined functions  
| were installed by job DSNTIJRT:

- | • DSNWSCVV
- | • DSNWSCVC
- | • DSNWCCV
- | • DSNWCCC

| **Procedure**

| To set up the web service user-defined functions:

- | 1. The default timeout to read data from a web service provider is two seconds.  
| Increase the timeout value by redefining the web service user-defined functions  
| with the key and value pair DB2SOAP\_TIMEOUT=X in the ENVAR parameter  
| values, where X is a number that specifies the timeout value in seconds.

- |
- | 2. If you want to use SOAP Version 1.2, include the key and value pair
- | DB2SOAP\_VERSION=SOAP\_12 in the ENVAR parameter values. By default,
- | DB2 uses SOAP Version 1.1. If you specify any other value for
- | DB2SOAP\_VERSION besides SOAP\_12, SOAP Version 1.1 is assumed.

| If your subsystem uses SOAP Version 1.1 and SOAP Version 1.2, you must

| define two sets of SOAP user-defined functions: one without

| ENVAR("DB2SOAP\_VERSION=SOAP\_12"), and one with

| ENVAR("DB2SOAP\_VERSION=SOAP\_12").

- |
- | 3. If you want to receive SOAP error messages, specify the ENVAR option
- | RETURN\_ERROR=YES.

| If RETURN\_ERROR=NO or the option is not specified and an error occurs, the

| web service provider returns a SOAP response to the client with an HTTP

| return code set other than 200. In this case, the user-defined functions end with

| SQLCODE=-443 and the complete HTTP response that was sent by web service

| provider is stored in the WSERROR DD file, as specified in the WLM startup

| procedure. The file contains the actual bytes that are sent by the web service

| provider.

| If you specify RETURN\_ERROR=YES, the SOAPHTTP user-defined function

| writes the HTTP content to the WSERROR DD file when the HTTP status code

| is not 200. It also builds a new XML document with an error element node that

| contains an "httprc" attribute around the SOAP response, as follows:

| <error httprc="{HTTP status code}">

|     {SOAP response}

| </error>

|

| The XML document is returned without issuing SQLCODE -443. Your

| applications must check for a root element node of error to determine if an

| HTTP error is returned. If an HTTP error is returned, the applications must

| process the SOAP response to handle the error.

- |
- | 4. If you do not use the DSNWLM\_WEBSERVICES core WLM environment, add
- | the following DD card to the WLM startup procedure where the user-defined
- | functions are defined.

| // WSERROR DD PATH='<HFS filename>',

| // PATHOPTS=(ORDWR,OCREAT,OAPPEND),

| // PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIWGRP,SIROTH,SIWOTH)

| where <HFS filename> is the name of an HFS, such as /tmp/wsc.err.

| If the response is in Unicode, you can browse the file on an MVS system by

| issuing the following command:

| iconv -f UTF-8 -t IBM-1047 < tmp/wsc.err

|

| You can store the contents in EBCDIC by saving it to another file by issuing the

| following command:


| iconv -f UTF-8 -t IBM-1047 < wsc.txt > wsc\_ebcdic.txt

|

| You can also FTP the file in BINARY mode to a workstation and open it using

| a text editor.

| **Related concepts:**

|  The SOAPHTTPNV and SOAPHTTPNC user-defined functions (DB2

| Application programming and SQL)

| **Related reference:**

|  AT-TLS policy statements (z/OS Communications Server: IP Configuration

| Reference)



## Supported web service calls:

The web service user-defined functions support unsecured web services, HTTP Basic Authorized web services, and HTTPS Secured web services.

### 1. Unsecured web services

For unsecured web services, the HTTP request that contains SOAP is sent in clear text to the web service provider, where no authentication is performed. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
http://[hostname[:port]]/[path]
```

### 2. HTTP Basic Authorized web services

For HTTP Basic Authorized web services, the specified user and password is encoded in Base64 and sent as part of an HTTP Header. The HTTP request that contains SOAP is sent in clear text to the web service provider, where it authenticates the supplied user and password before processing the request. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
http://[user[:password]@]hostname[:port]/[path]
```

### 3. HTTPS Secured web services

For HTTPS Secured web services, as part of the HTTPS protocol, the complete HTTP request that contains SOAP is encrypted and sent to the web service provider. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
https://[hostname[:port]]/[path]
```

## Enabling the web service user-defined function support for HTTPS:

Support for HTTPS in the web service user-defined functions uses Application Transparent Transport Layer Security (AT-TLS). AT-TLS is based on z/OS System SSL, and it transparently implements Transport Layer Security (TLS) protocols in the TCP layer of the stack.

### About this task

SSL connections make use of public/private key mechanisms (PKI) for authenticating each side of the SSL session and agreeing on bulk encryption keys to be used for the SSL session. To use PKI, public/private key pairs must be generated. In addition, X.509 certificates (which contain public keys) might need to be created, or certificates must be requested, received, and managed.

System SSL supports the following two methods for managing PKI private keys and certificates:

- A z/OS shell-based program called `gskkyman`. `gskkyman` creates, fills in, and manages a z/OS file that contains PKI private keys, certificate requests, and certificates. This z/OS file is called a key database and, by convention, has a file extension of `.kdb`.
- The z/OS Security Server (RACF) `RACDCERT` command. `RACDCERT` installs and maintains PKI private keys and certificates in RACF.

### Procedure

To enable support for HTTPS and AT-TLS:

1. Specify the `TTLS` parameter on the `TCPCONFIG` statement in `PROFILE`.

2. To protect TCP/IP connections, you can configure the RACF EZB.INITSTACK.sysname.tcpname resource in the SERVAUTH class to block all stack access except for the user IDs that are permitted to use the resource. Refer to member EZARACF in sample data set hlq.SEZAINST where hlq is the high level qualifier data set name for TCPIP data sets.
3. Configure AT-TLS policy rules. The policy agent provides AT-TLS policy rules to the TCP/IP stack. Each rule defines a set of security conditions that the policy agent compares to the conditions at the connection that it is checking. When the policy agent finds a match, it assigns the connection to the actions that are associated with the rule.
4. Create a client keyring for each client with necessary certification authority certificates. The name of the client keyring should match the name that is provided for the keyring in the policy configuration file.  
If the web service user-defined functions are defined with DB2 security, the authorization ID that is associated with the WLM-established address space where the user-defined functions are defined must have all the necessary permissions to access the keyring.
5. Stop and start TCP/IP stacks.
6. Start the policy agent. Verify that message EZZ4248E is released from the console.

## Results

Setup is complete and you can run the web service user-defined functions with HTTPS.

## Enabling DB2 as a web service provider

Enabling DB2 as a web service provider allows you to create web services on z/OS with your DB2 data and applications.

### About this task

DB2 for z/OS as a web service provider has the following prerequisites:

- Enable JDBC (legacy or universal) in DB2.
- Install WebSphere Application Server Version 5 or later on z/OS.
- Ensure that the WebSphere Application Server library contains the following two files:
  - mail.jar
  - activation.jar

If mail.jar is not present, download JavaMail Version 1.2 or later. If activation.jar is not present, download JavaBeans Activation Framework Version 1.0.1 or later.

To use DB2 Web Services Object Runtime Framework (WORF), you need to make the run time services available to WebSphere Application Server (WAS). By default, WORF is installed in the HFS directory:

```
/usr/lpp/db2a10_worf/
```

The base installation directory contains the lib/ subdirectory that contains the run time JAR file worf.jar. To begin using WORF, copy worf.jar, mail.jar, and activation.jar to a WAS shared library directory that you have already set up and restart WAS.

WORF provides a sample web application in the following directory:

lib/services.war

The application contains sample Document Access Definition Extension (DADX) files that define sample DB2 web services.

## Procedure

To set up this application with sample DADX files:

1. Follow the instructions in the job prolog to customize and run job DSNTEJWS, which is located in the *prefix.SDSNSAMP* directory. DSNTEJWS creates the DB2 tables that are used by the sample application.
2. The sample application is set up to use universal JDBC driver connectivity to connect to a z/OS DB2 server. Configure WAS with JDBC providers that make use of universal JDBC driver and perform the following steps:

- a. Copy *services.war* to a temporary directory.
- b. Extract *services.war* by issuing the following command:
- c. Open the *group.properties* files, which are located in the following directories:

```
WEB-INF/classes/groups/dxx_sample  
WEB-INF/classes/groups/dxx_travel
```

Modify the *dbDriver*, *dbURL*, *userID*, and *password* fields to have the following values:

```
dbDriver=com.ibm.db2.jcc.DB2Driver  
dbURL=jdbc:db2://server:port/database  
userID=DB2_userid  
password=DB2_userid_password
```

- d. Compress the files by issuing the following command:

```
jar -cvf services.war *
```

3. Use a web browser to connect to your WAS Administrative Console.
4. Under "Applications", select "Install New Application".
5. Select the "Server Path" option, and type the location of the *services.war* file in the text box. If you installed Worf in the default location, the server path is:  

```
/usr/lpp/db2a10_worf/lib/services.war
```
6. Enter a context root for the application (for example, *services*). Click "Next".
7. On the following screens, respond as necessary for your local setup. You can accept the default settings.
8. On the last screen, click "Finish". Click "Save to Master Configuration" to apply your changes.

## What to do next

To load the application:

1. On the WAS Administrative Console's main page, under "Applications", select "Enterprise Applications". Select the application and click "Start" to load the application.
2. After the application loads, point a browser to your server with the context root that you chose (for example, `http://server:port/services/`). The welcome page lists the sample DADX files that are provided in *services.war*. To test the services, click on the links.

## Enabling DB2 as a web service consumer

Enabling DB2 as a web service consumer allows you to receive web service data in your DB2 applications.

### Before you begin

DB2 for z/OS as a web service consumer has the following prerequisites:

- Install IBM XML Toolkit for z/OS 1.10
- Configure TCP/IP

### About this task

Installation job DSNTIJMV contains sample startup procedure DSNWLM, which you can use as a model for your startup procedures. You must modify the startup procedure only if the web services routines are not defined to the DSNWLM\_WEBSERVICES core WLM environment.

### Procedure

To enable DB2 as a web service consumer:


1. Change the following items in each startup procedure:
  - a. Change the procedure name from DSNWLM to the procedure name that you specified when you set up the WLM application environment.
  - b. Change the value of APPLENV to the name of the WLM application environment that you set up for the web services consumer user-defined functions. The name of this environment must match the WLMENV parameter value in the configuration control statement for each stored procedure in job DSNTIJRT.
  - c. Change the value of DB2SSN to your DB2 subsystem name.
  - d. Add the data set name of the XML Toolkit load library (XPLINKed version) to the STEPLIB concatenation. If you used the default data set names when you installed the XML Toolkit, the load library data set name is *userid.SIXMLOD1*.
  - e. Ensure that the DB2 SDSNLOD2 library is added to the STEPLIB.
2. After you set up the WLM application environment, create a JCL startup procedure for the stored procedure address space.

---

## The IBM Data Server Driver for JDBC and SQLJ

If you plan to run JDBC or SQLJ applications, you need to install the current version of the IBM Data Server Driver for JDBC and SQLJ. You must complete this task after you install DB2 for z/OS or migrate to the current version of DB2 for z/OS.

### Related tasks:

 [Installing the IBM Data Server Driver for JDBC and SQLJ on DB2 for z/OS \(DB2 Application Programming for Java\)](#)

---

## Connecting the IMS attachment facility

Connecting DB2 to IMS requires coordination with your company's group that supports IMS systems.

## Procedure


To connect the IMS attachment facility:

- Make DB2 load modules available to IMS.
- Define DB2 to IMS.
- Define new programs and transactions to IMS.
- Depending on your site, you might also need to:
  - Define DB2 plans for IMS applications.
  - Generate a user language interface.

## What to do next

An IMS system definition might be required to complete the steps to connect DB2 to IMS. If RACF is installed, you also need to define the IMS-to-DB2 connection to RACF.

### Related tasks:

 [Defining DB2 resources to RACF \(Managing Security\)](#)

## Making DB2 load modules available to IMS

As part of connecting DB2 to IMS, you must make the DB2 load modules available to IMS.

### About this task

If you have already included the *prefix.SDSNLOAD* library in your *LNKLSTxx*, you can skip this step. Version 8 and DB2 9 modules will be available through normal z/OS module search.

## Procedure

To make DB2 load modules available to IMS:

- If DB2 load libraries are not included in your *LNKLSTxx*, add *STEPLIB* statements to your startup procedures.
- Add *prefix.SDSNLOAD* to the *DFSESL DD* statement.
- If any IMS region connects to more than one release of DB2, then you must ensure that the DB2 load library that is used for that region is compatible with each release. The IMS attachment facility is upward compatible, but not downward compatible. This means that you should use the oldest release of the DB2 load library for the IMS region.
  - If all the data sets referred to in the *JOBLIB* or *STEPLIB* statement for an IMS region are APF-authorized, then add the *DD* statement for *prefix.SDSNLOAD* to the *JOBLIB* or *STEPLIB* statement. If the *DYNAM* option of COBOL is being used, the *IMS RESLIB DD* statement must precede the reference to *prefix.SDSNLOAD* in the *JOBLIB* or *STEPLIB* statement.
  - Add the *ddname DFSESL DD* statement for *prefix.SDSNLOAD*. All libraries specified on the *DFSESL DD* statement must be APF-authorized. The *DFSESL DD* statement is not required by DB2 DL/I batch support. IMS requires that an *IMS RESLIB DD* statement also be referenced by the *DFSESL DD* statement, as in the following:

```
//DFSESL DD DSN=ims_reslib,DISP=SHR
// DD DSN=prefix.SDSNLOAD,DISP=SHR
```

## Defining DB2 to IMS

To define DB2 to IMS, the DB2 identification must be defined to the control region and the DL/I batch region. Optionally, you can also define the DB2 identification to each dependent region that accesses the DB2 subsystem.

### Procedure

To define DB2 to IMS:

1. Name an SSM member in IMS.PROCLIB by concatenating the value of the IMSID field of the IMS IMSCTRL macro (one to four alphanumeric characters) with any name (one to four alphanumeric characters) defined by your site. Each SSM entry in IMS.PROCLIB defines at least one connection from an IMS region to at least one different z/OS subsystem. One SSM member can be shared by all of the IMS regions, or a specific member can be defined for each region. This record contains as many entries as there are connections to external subsystems. Each entry is an 80-character blocked or deblocked record. Fields are keyword or positional and are delimited by commas. The fields in this record are:

SST=,SSN=,LIT=,ESMT=,RTT=,REO=,CRC=

where:

#### **SST=DB2**

Identifies a required one-to eight-character name that defines the external subsystem type. It must be set to DB2 for IMS to connect to DB2.

#### **SSN=**

Identifies a required one-to four-character DB2 subsystem name. This name must be the name you specified for SUBSYSTEM NAME on installation panel DSNTIPM. The default is DSN1.

#### **LIT=**

Identifies a required four-character alphanumeric option, specifying the language interface token (LIT) supplied to IMS. The IMS-supplied language interface module (DFSLI000) requires a value of **SYS1** for this option.

#### **ESMT=**

Identifies a required one-to eight-character alphanumeric option specifying the external subsystem module table. This module specifies which attachment modules must be loaded by IMS. **DSNMIN10** is the required value for this field.

#### **RTT=**

Identifies an optional one to eight character alphanumeric name of the user-generated resource translation table (RTT). This table maps the IMS application names into DB2 plan names. If this entry is omitted, the DB2 plan name is the IMS application load module name.

#### **REO=**

Identifies the optional one-character region error option to be used if an IMS application attempts to reference a non-operational external subsystem or if resources are unavailable at create thread time. If DB2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.

**R** Passes a SQL return code to the application, indicating that the request for DB2 services failed (default). The most commonly

returned SQL codes are -922, -923, and -924. However, there might be other SQL codes returned to the application.

When the first connection to DB2 cannot be established, a SQL return code is not returned. Instead, the application is terminated with an abend code U3047.

- Q** Abends the application with an abend code U3051, backs out activity to the last commit point, does a PSTOP of the transaction, and re-queues the input message. This option only applies when an IMS application attempts to reference a non-operational external subsystem or if the resources are unavailable at create thread time. If DB2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.
- A** Abends the application with an abend code of U3047 and discards the input message. This option only applies when an IMS application attempts to reference a non-operational external subsystem or if the resources are unavailable at create thread time. If DB2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.

If DB2 is not active or the connection cannot be established when the first SQL call is made from the application program (such as DB2 unavailable, DB2 quiescing, or DB2 terminating), the action you take depends on the region error option specified. SQL codes of -922, -923, or -924 might be returned to the application if option R is specified.

You can change the default for an application if a resource translation table entry is generated for that application.

**CRC=**

Identifies a command recognition character used by IMS to identify DB2 commands entered from an IMS terminal with the /SSR command. Any character is valid for the CRC except the period (.), slash (/), or comma (,). The default CRC is the hyphen (-).

These options apply to DL/I batch only:

**CONNECTION\_NAME=**

Represents the name of the job step that is the coordinator for DB2 activity. The connection name is optional. The connection name defaults are:

*Table 159. Default connection names for DL/I batch*

Type of Application	Default Connection Name
Batch job	Job name
Started task	Started task name
TSO user	TSO authorization ID

If a batch job fails, you must use a separate job to restart the batch job. The connection name used in the restart job must be the same as the name used in the batch job that failed. Or, if the default connection name is used, the restart job must have the same job name as the batch update job that failed.

DB2 requires unique connection names for DB2 DL/I batch support. If two applications try to connect with the same connection name, then the second application is not allowed to connect to DB2. CONNECTION\_NAME can be 1 to 8 characters long.

**PLAN=**

Identifies a DB2 plan name. If you do not specify a plan name, the

application program module name is checked against the optional resource translation table. If a match is found, the translated name is used as the DB2 plan name. If no match is found, the application program module name is used as the plan name. PLAN can be 1-8 characters long.

**Important:** If you use the External Subsystem Attach Facility (ESAF) and the IBM Data Server Driver for JDBC and SQLJ to connect to a DB2 subsystem, a set of JDBC driver packages with a collection name that matches the application program module name (PSB name) must exist. If no packages with a matching collection name exist, you need to bind a set of driver packages with the -collection parameter value set to the application program module name. See DB2Binder utility (DB2 Application Programming for Java) for information on binding JDBC driver packages.

#### **PROG=**

Identifies the name of the application program that is to be loaded and to receive control. PROG is required and can be 1-8 characters long.

2. Provide support for entering DB2 commands through IMS by defining the command recognition character (CRC) in the SSM member of the IMS control region. If the /SSR command is entered through the z/OS console, the AUTHID WTOR needs to be granted the appropriate authority. If the /SSR command is entered through an IMS terminal, the IMS LTERM name or the signon ID (if active) needs to be granted the appropriate authority. The /SSR command format is:

```
/SSR crc DB2 command
```

as in

```
/SSR -DISPLAY THREAD (*)
```

3. Specify the SSM EXEC parameter in the startup procedure of the IMS control, MPP, BMP, or DL/I batch region. The SSM is concatenated with the IMSID to form a member name in IMS.PROCLIB. The IMSID comes from the IMSID option of the IMSCTRL generation macro or the IMSID option in the control region startup procedure.

For DL/I batch regions, you can specify the DB2 connection parameters in the DDITV02 data set instead of an SSM member. The DDITV02 data set and an SSM member have the same format.

If you specify the SSM for the IMS control region, any dependent region running under the control region can attach to the DB2 subsystem named in the IMS.PROCLIB member specified by the SSM parameter. The IMS.PROCLIB member name is the IMS ID (IMSID=xxxx) concatenated with the one to four characters specified in the SSM EXEC parameter. The IMS ID is the IMSID parameter of the IMSCTRL generation macro.

IMS allows you to define as many external subsystem connections as are required. More than one connection can be defined for different DB2 subsystems. All DB2 connections must be within the same z/OS system. For a dependent region, you can specify a dependent region SSM or use the one specified for the control region. You can specify different region error options (REOs) in the dependent region SSM member and the control region SSM member. The following table shows the different possibilities of SSM specifications.



Table 160. SSM specifications options

SSM for Control Region	SSM for Dependent Region	Action	Comments
No	No	None	No external subsystem can be connected
No	Yes	None	No external subsystem can be connected.
Yes	No	Use the control region SSM	Applications scheduled in the region can access external subsystems identified in the control region SSM. Exits and control blocks for each attachment are loaded into the control region address space.
Yes	Yes (NULL entry)	No SSM is used for the dependent region	Applications scheduled in this region can access DL/I databases only. Exits and control blocks for each attachment are loaded into the control region address space and each dependent region address space.
Yes	Yes	Check the dependent region SSM with the control region SSM.	Applications scheduled in this region can access only external subsystems identified in both SSMs. Exits and control blocks for each attachment are loaded into the control region and the dependent region address space.

No specific parameter exists to control the maximum number of SSM specification possibilities.

**Related concepts:**

- ➡ Input and output data sets for DL/I batch jobs (DB2 Application programming and SQL)
- ➡ Items to include in a batch DL/I program (DB2 Application programming and SQL)
- ➡ System definition

**Related tasks:**

Defining DB2 plans for IMS applications (optional)

**Defining new programs and transactions to IMS**

You can define new programs and transactions that access DB2 resources to your IMS system.

**About this task**

Coordinate with your IMS support group to install the programs and transactions for Phase 4 of the verification process.

Programs and transactions already defined to IMS can use SQL without any additional definition to IMS.

**Related tasks:**

Verifying that installation or migration was successful with the sample applications

## Defining DB2 plans for IMS applications (optional)

The application plan defines the DB2 resources that an application accesses.

### About this task

The application plan is identified by its plan name. Each IMS application is associated with a plan name.

The default is to have the DB2 plan name the same as the IMS application program load module name. If you assigned a different name to the plan, you need a resource translation table (RTT). If you chose an error option different from the REO default, you also need an RTT. DB2 provides the DSNMAPN macro in *prefix.SDSNMACS* to generate an RTT. After it is assembled, the table must be link-edited as REENTRANT with RMODE=24 into any authorized library that is concatenated with the library from which IMS loads the DB2 IMS attach modules.


The format of DSNMAPN macro is shown in the following table.

Table 161. DSNMAPN macro format

Macro	Option	Meaning
DSNMAPN	APN=	IMS application name
	,PLAN=	Associated DB2 plan name
	[,OPTION=]	Specific entry error option R, Q, or A. See REO in the SSM entry.
	[,END=]	Indicates last entry (YES/NO). NO is the default.

### Related concepts:

IMS attachment facility macro (DSNMAPN)

 Items to include in a batch DL/I program (DB2 Application programming and SQL)

## IMS language interface module

You must generate a user language interface only if you intend to access two DB2 subsystems from the same dependent region.

To provide this access, the subsystem member (SSM) must contain one entry for each subsystem. Each entry contains a different subsystem ID and its associated language interface token (LIT). IMS provides the DFSLI macro to generate additional language interface modules with unique LITs. The general format of the macro is shown in the table below.

Table 162. DFSLI macro format and meaning

Macro	Option	Meaning
DFSLI	TYPE	Specifies the type of subsystem that can be accessed through this language interface module. DB2 is the only value supported by this option

Table 162. DFSLI macro format and meaning (continued)

Macro	Option	Meaning
	LIT	Defines a name (called LIT) to relate a language interface module with an entry in the SSM for the dependent region

When an IMS application issues a DB2 request, IMS knows the target subsystem by the LIT used in the request. For example, consider the case of a dependent region accessing two DB2 subsystems (DSN1 and DSN2):

- You generate a language interface with LIT=SYS2 (DFSLI001).
- You define two entries in the SSM member. The first entry points to DSN1 with LIT=SYS1; the second points to DSN2 with LIT=SYS2.
- You link-edit applications accessing the DSN1 subsystem with the IMS-provided language interface (DFSLI000).
- You link-edit applications accessing the DSN2 subsystem with the user-generated language interface (DFSLI001).

Even though a region can communicate with two or more DB2 subsystems, an IMS application can access only one—the DB2 subsystem referred to in the language interface that is link-edited. You can alter the SSM to route application requests to a different DB2 subsystem.

## IMS attachment facility macro (DSNMAPN)

The DSNMAPN macro is required when the IMS application load module name is different than the name of its related IBM DB2 application plan. The macro is also required if the error option is different than the ERR value that is specified on the IMS SSM entry.

Macro statements are assembled in *prefix.SDSNMACS* and must be link-edited as REENTRANT with RMODE=24 into the DB2 library *prefix.SDSNLOAD*. The module name must be specified on the IMS SSM entry for the DB2 subsystem. The name must be specified as in the RTT entry for the SSM member defining the connection of this region. IMS loads the RTT module into the dependent region address space.

### Note:

1. The macro name must be followed by one or more blanks before options are coded.
2. Multiple options must be separated by commas (with no blanks).

### **label DSNMAPN**

DSNMAPN is the name of the macro. It must be coded exactly as it appears here, and it must be separated from any optional options by one or more blanks.

For *label*, substitute the CSECT name of your module. This name must match the name of the module specified to the linkage editor. *Label* is optional except for the first invocation of the DSNMAPN macro. The last invocation requires END=YES.

### **APN=program-name**

Specifies the name of an application load module scheduled by IMS. For *program-name*, substitute an application name of up to eight characters.

**PLAN=*plan-name***

Specifies an application plan name that is used (instead of the default application name) when a thread is created. For *plan-name*, substitute an application plan name of up to eight characters.

**OPTION=R|Q|A**

Specifies the action taken when an application program call cannot be performed because there is some problem in communication between the application program and the DB2 subsystem or if resources are unavailable. The value can be R, Q, or A.

If OPTION is not specified, the region error option (REO) is used.

**R** Specifies that a return code is returned to the application to indicate that the request for DB2 services failed.

**Q** Specifies that the transaction is abnormally terminated with an abend code U3051, activity is backed out to the last commit point, and the input message is re-queued.

**A** Specifies that the transaction is abended with an abend code of U3047, and the input message is deleted.

**Default:** R

**END=NO|YES**

Specifies whether this is the last DSNMAPN macro invocation. The value can be NO or YES.

**NO** Specifies that this is not the last DSNMAPN macro invocation.

**YES**

Specifies that this is the last DSNMAPN macro invocation.

**Default:** NO

The last DSNMAPN macro invocation must be followed by the specification END=YES.

**Usage notes**

- To enter more than one application name (with its corresponding plan name and OPTION specification), you must use multiple invocations of the DSNMAPN macro. The first invocation requires the label; the last invocation requires END=YES.
- Invocations must be in ascending order by application name. If they are not, an MNOTE macro error is generated.

**Related tasks:**

Defining DB2 plans for IMS applications (optional)

---

## Connecting distributed database systems

You can use the distributed data facility (DDF) of DB2 to access data that is held by other data management systems. You can also use DDF to make your DB2 data accessible to other systems.

**About this task**

DB2 does not place any upper limit on the number of systems it can connect to; available storage is the limiting factor.

**Related concepts:**

➡ Communicating with data sharing groups (DB2 Data Sharing Planning and Administration)

## The communications protocols

DDF uses TCP/IP or SNA to communicate with other systems.

The figure below shows the connectivity options that you have with DDF in DB2.

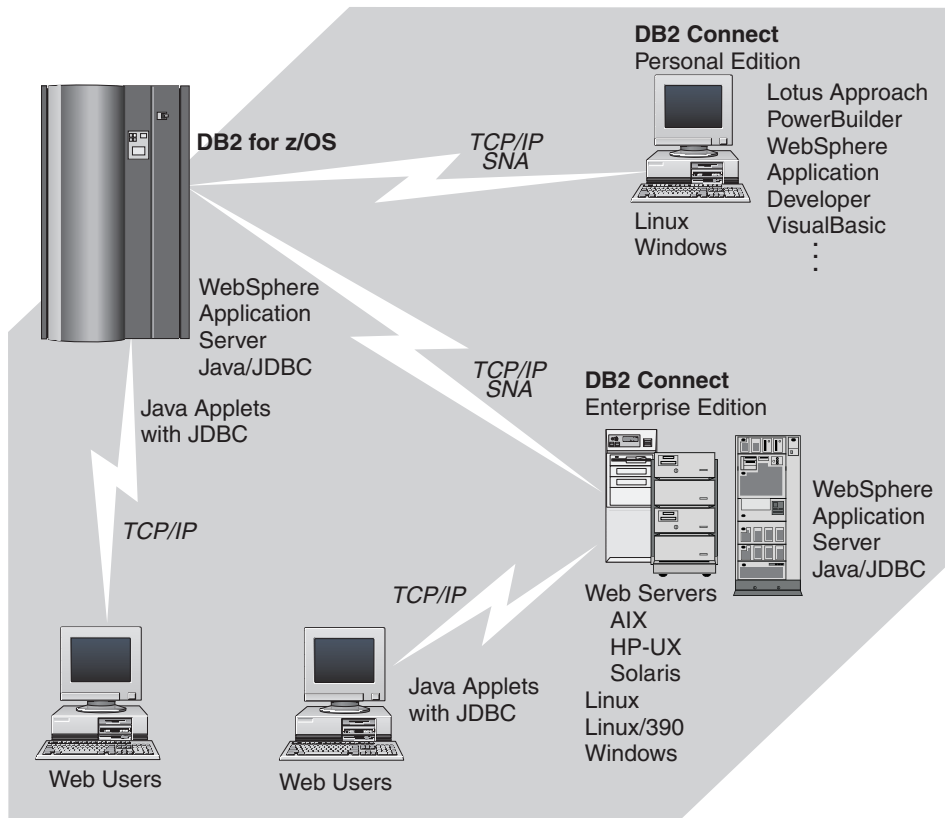


Figure 119. Connectivity options

Setting up a network for use by database management systems requires knowledge of both database management and communications. Thus, you must put together a team of people with those skills to plan and implement the network.

## The role of the communications database (CDB)

When sending a request, DB2 uses the LINKNAME column of the SYSIBM.LOCATIONS catalog table of the communications database (CDB) to determine which protocol to use.

To receive VTAM requests, you must specify an LUNAME on installation panel DSNTIPR. To receive TCP/IP requests, you must select a DRDA port and a resynchronization port on installation panel DSNTIP5. TCP/IP uses the server's port number to pass network requests to the correct DB2 subsystem.

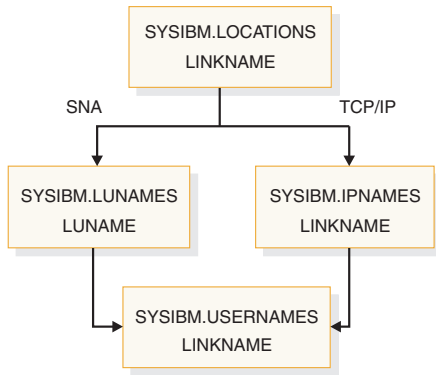


Figure 120. The LINKNAME column of SYSIBM.LOCATIONS determines protocol

If the value in the LINKNAME column is found in the SYSIBM.IPNAMES table, TCP/IP is used for DRDA connections. If the value is found in SYSIBM.LUNAMES table, SNA is used. If the same name is in both SYSIBM.LUNAMES and SYSIBM.IPNAMES, TCP/IP is used.

**Attention:** A requester cannot connect to a given location using both SNA and TCP/IP protocols. For example, if your SYSIBM.LOCATIONS table specifies a LINKNAME of LU1, and LU1 is defined in both the SYSIBM.IPNAMES and SYSIBM.LUNAMES table, TCP/IP is the only protocol used to connect to LU1 from this requester for DRDA connections.

## The DRDA database protocol

Applications can use the Distributed Relational Database Architecture™ (DRDA) protocol to control remote access.

With DRDA, the application connects to a server at another location and executes packages that have been previously bound at that server. The application uses a CONNECT statement, a three-part name, or an alias to access the server.

Queries can originate from any system or application that issues SQL statements as a *requester* in the formats required by DRDA.

For two-phase commit using Systems Network Architecture (SNA) connections, DB2 supports both presumed abort and presumed nothing protocols that are defined by DRDA. If you are using TCP/IP, DB2 uses the sync point manager that is defined in the documentation for DRDA Level 3.

### Related concepts:

➡ Types of Two-Phase Commit (z/OS MVS Programming: Resource Recovery)

### Related information:

➡ The Open Group

## Preparing your system for DRDA access

In DB2 10, private protocol is no longer supported. Plans and packages that were bound with DBPROTOCOL(PRIVATE) and access remote locations can exist in DB2 10, but attempts to load or run those plans or packages fail. DB2 provides a tool for preparing a subsystem to use DRDA access only.

## Procedure

To prepare a DB2 subsystem to use DRDA access only:

1. Run migration job DSNTIJPB. This job identifies any plans and packages that must be rebound with DBPROTOCOL(DRDA). The DSNTIJPB queries identify two categories of plans or packages that were previously bound with DBPROTOCOL(PRIVATE):
  - Objects that only need to be rebound with DBPROTOCOL(DRDA).
  - Objects that have a private protocol remote location dependency, which at a minimum will require that the object be rebound with DBPROTOCOL(DRDA).
2. Run migration job DSNTIJPD to call the private protocol to DRDA protocol REXX tool (DSNTP2DP). The tool creates recommended commands to convert packages and plans to DBPROTOCOL(DRDA).
3. Review and edit the output of the DSNTP2DP tool as needed, and submit the commands to rebound the packages and plans to use DRDA protocol.
4. After all plans and packages have been successfully rebound, monitor a test of the applications.
  - If a package not found error (SQLCODE -805) occurs for a package at a remote location, the error is likely caused by the application using embedded dynamic SQL. The location that is specified in the error could not be determined from the catalog or the SQL statement text in the package. To fix this problem, submit a BIND PACKAGE COPY statement for the indicated package with the indicated location name specified as the target:

### GUPI

```
BIND PACKAGE(location-name.collection-id) -  
  COPY(collection-id.package-id) -  
  COPYVER(version-id) OPTIONS(COMPOSITE) -  
  OWNER(owner) QUALIFIER(qualifier) -  
  DBPROTOCOL(DRDA) SQLERROR(CONTINUE)
```

### GUPI

- A package error might also occur for a plan that could not be previously determined to access remote locations, and therefore its package list did not contain packages at remote locations. If you receive such an error, rebound the plan and use the PKLIST keyword to create a new package list. The package list should either contain the additional remote package or have a wildcard (\*) prefixed to each of the local package names in the list.

### The private to DRDA protocol REXX tool (DSNTP2DP):

To help you convert your plans and packages from using private protocol to using DRDA protocol, DB2 provides the private to DRDA protocol REXX tool, DSNTP2DP. This tool scans your catalog and generates the necessary commands to convert all objects that have a private protocol and remote location dependency to DRDA.

Use job DSNTIJPD to invoke DSNTP2DP. You can tailor the generated output from the tool and run it at your discretion.

A package or plan has a private protocol and remote location dependency when the plan or package is bound with the DBPROTOCOL(PRIVATE) option and

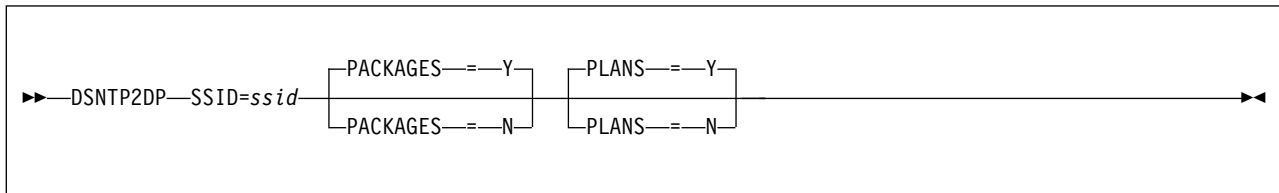
accesses remote locations. Packages and plans that were bound with the DBPROTOCOL(PRIVATE) option and access remote locations cannot execute in DB2 10.

### Authorization required

The DSNTP2DP statement itself requires no privileges to execute.

### Syntax diagram

The private to DRDA protocol REXX tool (DSNTP2DP) statement defines the function that the tool performs.



### Option descriptions

DSNTP2DP has the following required parameter:

#### **SSID=ssid**

Specifies the subsystem ID of the DB2 subsystem for DSNTP2DP to examine. The subsystem ID is used to connect the tool to the DB2 subsystem.

The default is ssid.

DSNTP2DP has the following optional parameters. If none of the optional parameters are specified, DSNTP2DP examines all catalog objects (plans and packages).

#### **PACKAGES**

Specifies whether DSNTP2DP processes packages.

Y DSNTP2DP examines packages in the catalog. The default is Y.

N DSNTP2DP does not examine packages in the catalog.

#### **PLANS**

Specifies whether DSNTP2DP processes plans.

Y DSNTP2DP examines plans in the catalog. The default is Y.

N DSNTP2DP does not examine plans in the catalog.

### DRDA enhancements for migration from DB2 Version 8

Enhancements to DRDA in DB2 10 improve performance and security.

Some of the DRDA enhancements in DB2 10 include:

- DB2 10 can use IPv6 only with DRDA.
- DDF supports running the address space in AMODE 64, which relieves the storage constraints that exist in DB2 Version 8. The performance of TCP/IP has improved because the communications buffer is in 64-bit shared memory. This change means that you do not have to copy the buffer into your own address space or into the DBM1 address space. Reply communications are built and



defined in 64-bit shared memory and can be pointed to instead of copied into your own address space or into the DBM1 address space.

- DB2 10 can use trusted application servers with DRDA.
- The performance of LOB retrieval is improved.
- VTAM independence allows you to set up a DB2 10 DDF to support TCP/IP and DRDA access.
- DB2 10 has a new DRDA secure port, which allows use of SSL authentication methods. SSL authentication methods support secure communications between a client and DB2 10.
- DB2 10 uses new DRDA capabilities to encode DRDA metadata in Unicode instead of EBCDIC, thereby eliminating the need for character conversion from EBCDIC to Unicode.
- New monitoring capabilities in DRDA enable monitoring tools to track the execution of statements and to track the sequence of transactions in the distributed environment.
- DB2 10 supports the following new DRDA user data type capabilities:
  - TIMESTAMP data (SQLTYPE 392/393) with extended timestamp precisions
  - TIMESTAMP WITH TIME ZONE data type (SQLTYPE 2448/2449)
- DB2 10 implements new DRDA capabilities that support various new DB2 10 SQL functions. If new DRDA capabilities are required to support the new DB2 10 SQL functionality, then the requester system must be at the correct DRDA level to use the new SQL function. These new capabilities include support for the PREPARE ATTRIBUTES clause CONCENTRATE STATEMENTS WITH LITERALS.
- DRDA always resolves aliases during a PREPARE of a dynamic SQL statement or binding of a static statement into a package at a remote location.

## **DRDA enhancements for migration from DB2 9**

DB2 10 introduces enhancements to made to DRDA.

The DRDA enhancements in DB2 10 include:

- DB2 uses new DRDA capabilities to encode DRDA metadata in Unicode instead of EBCDIC, thereby eliminating the need for character conversion from EBCDIC to Unicode.
- New monitoring capabilities in DRDA enable monitoring tools to track the execution of statements and to track the sequence of transactions in the distributed environment.
- DB2 supports the following new DRDA user data type capabilities:
  - TIMESTAMP data (SQLTYPE 392/393) with extended timestamp precisions
  - TIMESTAMP WITH TIME ZONE data type (SQLTYPE 2448/2449)
- DB2 implements new DRDA capabilities that support various new DB2 10 SQL functions. If new DRDA capabilities are required to support the new DB2 10 SQL functionality, then the requester system must be at the correct DRDA level to use the new SQL function. These new capabilities includes support for the PREPARE ATTRIBUTES clause CONCENTRATE STATEMENTS WITH LITERALS.
- DRDA always resolves aliases during a PREPARE of a dynamic SQL statement or binding of a static statement into a package at a remote location.

## DDF installation and implications for DB2

The installation options for DDF are described on installation panels DSNTIPR and DSNTIP5.

Use these options to define, among other things:

- Whether you want DDF to start automatically when DB2 starts
- Important names for this DB2 subsystem, including a LU name and NETID  
If you plan to use both VTAM and TCP/IP, you must define an LU name and NETID. DB2 as a requester generates the unit of work using NETID and LUNAME.
- Thread management options
- Security options
- TCP/IP port numbers
- Control of the number of DRDA query blocks that can flow on a network request that was specified with OPTIMIZED FOR  $n$  ROWS where  $n$  exceeds the number of rows that fit in a single query block.

If you do not plan on using SNA/APPC communications, you can set up DDF to not activate its SNA/APPC support. To set up DDF to not activate its SNA/APPC support, give the DB2 subsystem an IPNAME value by updating the BSDS DDF record. Setting up DDF to not activate its SNA/APPC support is not supported by the DB2 installation option panels. DB2 TCP/IP communications uses the IPNAME value and a character representation of the TCP/IP resync port (RESPORT) hexadecimal value to identify units of work.

**Support for extended dynamic SQL:** If this DB2 subsystem services requesters that support extended dynamic SQL, such as DB2 Server for VSE & VM, enter YES in field DESCRIBE FOR STATIC on installation panel DSNTIPF. This option lets applications from the requesting system execute SQL DESCRIBE statements that appear as extended dynamic SQL statements in the requesting system, but appear as static SQL in the DB2 package. For the option to take effect, you must bind the package with DESCRIBE FOR STATIC enabled.

**Test your connections** You should test systems with each other to ensure that their communications setups are correct. If you are testing with another DB2 for z/OS, enter the location name of that other site in field REMOTE LOCATION of installation panel DSNTIPY. The remote location must also have DDF installed and active and must have run the first sample job, DSNTEJ1.

### Related reference:

DSNTIPR: Distributed data facility panel 1

DSNTIP5: Distributed data facility panel 2

 DSNJU003 (change log inventory) (DB2 Utilities)

---

## Connecting systems with VTAM

*Virtual Telecommunications Access Method* (VTAM) is a program that you can use to control remote DB2 communication.

### About this task

Remote communications terminology:

**Logical unit (LU)**

A source of requests entering the network and a receptor of replies from the network. For example, a particular DB2 is an LU.

**Session**

A logical connection between two LUs. Multiple sessions can run on a single physical connection.

**Conversation**

A dialog that uses a session to transfer information between transaction programs, such as DB2 to DB2. A single session can support multiple conversations, but only one at a time.

To prepare DB2 for communication using VTAM and the distributed data facility (DDF), complete the following steps. You can complete steps 1, 2, and 3 after installing DB2. Steps 6 through 8 are optional.

- **Step 1: Customize VTAM for DB2**

To make monitoring of the network easier, consider installing NetView.

- **Step 2: Choose names and a password**

You need to choose two names for the local DB2 subsystem: a location name and a logical unit name (LU name).

A *location name* distinguishes a specific database management system in a network, so applications use this name to direct requests to your local DB2 subsystem. Other systems use different terms for a location name. For example, DB2 Connect calls this the *target database name*. The DRDA term, *RDBNAM*, is used to refer to non-DB2 systems' relational database names.

An *LU name* is the name by which VTAM recognizes this subsystem in the network. You might need to know the LU names of other systems that can request data from the local DB2 subsystem, or you can use a default LU name of eight blanks.

If you plan to request data from other systems, you need the LU names *and* location names for those serving systems. Most of the time, system administrators and operators need to know both names, because they can use both names in various commands, and DB2 uses both names in messages.

In addition to the names mentioned above, you can choose an optional password to validate your local DB2 subsystem to VTAM. If the z/OS system on which DB2 is running is part of an z/OS Parallel Sysplex, you can choose a generic LU name to define a DB2 group to remote locations.

- **Step 3: Define the DB2 subsystem to VTAM**

Use the VTAM APPL statement to make the DB2 subsystem known to VTAM. You must include the APPL definitions in the VTAM SYS1.VTAMLST library at VTAM startup.

Also use the VTAM MODEENT statement to define default session modes. You must include mode tables in the VTAM SYS1.VTAMLIB library at VTAM startup.

Sample VTAM definitions are provided in the data set DSN8VTAM in SDSNSAMP and in examples throughout this topic.

- **Step 4: Populate the communications database**

The DB2 catalog includes the communications database (CDB), which contains several tables that hold information about your connections with remote systems. You must populate some of these tables before you can request data from those remote systems. If this DB2 system only services data requests, you do not have to populate the CDB; you can use the default values.

- **Step 5: Start VTAM to use DB2**

When you start VTAM to use DB2, you must be sure that the proper definitions are in the VTAM libraries VTAMLST and VTAMLIB.

- **Step 6: Tune the system**

This is an optional step, which you can do after you have established communications between two or more systems. The procedure outlined up to this point gives you default values for your DB2 modes and your class of service. Although the defaults are probably adequate for your preliminary testing, you can change them to improve performance in the network, or to assign different modes to different application plans.

When VTAM links two nodes, it establishes a session. The number of available sessions can have a significant impact on performance; therefore, you might need to modify your session limit values. Also, large amounts of DB2 data travelling through the network can severely affect VTAM storage, and you might need to tune buffer storage.

You can also tune the system by changing mode options. A *mode* describes various characteristics of a session, such as the maximum number of bytes sent at one time. Modes can point to a *class of service* table, which ranks the available virtual routes for this mode with respect to preference of use and paths through the network. Essentially, the class of service table allows you to assign different network priorities to your modes.

- **"Step 7: Create Aliases"**

This is an optional step. Each DB2 location can create aliases for the tables it wants to access, using DRDA, at the other DB2 locations.

- **"Step 8: Provide Authorization for an Appropriate Level of Security"**

**Related concepts:**

Sample VTAM definitions to connect two DB2 subsystems

**Related tasks:**

Calculating session limits


Calculating VTAM I/O buffer pool (IOBUF) storage

**Related reference:**


 [IBM Tivoli NetView for z/OS \(Installation: Getting Started\)](#)

 [Generic resources \(SNA Network Implementation Guide\)](#)

 [Implementing a VTAM network \(SNA Network Implementation Guide\)](#)

 [Tuning VTAM for your environment \(SNA Network Implementation Guide\)](#)

**Related information:**

 [Managing distributed access \(Managing Security\)](#)

## Customize VTAM for DB2

For DB2 to provide the best performance for distributed database systems, you probably need to customize VTAM.

Before you customize VTAM, consider the communication needs of your DB2 connections. Because you could allow your DB2 subsystem to send large amounts of data through the network, reexamine the capacity of your existing network. In some cases, portions of your existing network might need additional communication hardware to provide the required capacity.

**Related reference:**

## Choosing names and a password

When you connect a DB2 subsystem to VTAM, you must choose names for your local DB2 subsystem and, possibly, a VTAM password for it. You might also need to know the names of remote systems in the network.

### Choosing names for the local subsystem

You define the names for the local subsystem and its VTAM password to DB2 by using the installation panels, or by using the change log inventory utility.

#### Procedure

Choose the following names for the local DB2 subsystem:

- A unique name by which the other systems in the network can recognize your subsystem. The name can have from 1 to 16 characters and is called the *location name*. (DB2 Connect refers to this as the *target database name*.) Make sure that the local location name is different from the name of every other system in the network, no matter where it is physically located.

You must share the location name with the other systems that need to send SQL requests to this one.

The location name should not change even if the network changes. Therefore, tightly control the allocation of location names. To ensure uniqueness, you use an IBM-registered SNA NETID as the first six bytes of your location name. If location names are not unique, you have to change many programs and tables if your network is later joined with another network using the same location name.

The IBM recommendation for the NETID is the following format:

- The first two bytes are the country code as defined in ISO standard ISO 3166. These codes include the uppercase letters A through Z.
- The next four bytes are the enterprise code of the registering enterprise. This might already be registered with IBM as your SNA NETID. The enterprise code can include the uppercase letters A through Z, the numbers 0 through 9, and the underscore character (\_).

To register your SNA NETID, see your IBM representative.

- A name by which VTAM can recognize the local subsystem. It must be either a unique name or, in some cases, a generic name.
  - The *unique* name must be unique within the network of connected systems, can have from 1 to 8 characters, and is called the *LU name*. The LU name and the location name of a subsystem can be identical, but this is not recommended; LU names are unique only within a network, and networks can change. You must share the LU name with any system that requests data from your local subsystem. Later, you enter this name in the VTAM APPL statement.
  - If the z/OS system on which DB2 is running is part of an z/OS sysplex, you can use a *generic* 8-character name to represent a group of VTAM LU names. The generic name might be useful if your network is in a transitional period, and you want to use generic names to reference network nodes.

Specify the generic LU name in the field DB2 GENERIC LUNAME on installation panel DSNTIPR. Use column GENERIC of SYSIBM.LUNAMES to indicate that you want to use the generic LU name for CNOS processing and SQL requests to a particular server.

- Server location aliases. You can use the Change Log Inventory utility to define up to eight aliases for a location. Applications can use these alias names to refer to the local DB2 subsystem or data sharing group.

Aliases are most useful in a data sharing environment in which two or more DB2 subsystems are migrated to a single data sharing group. In this case, you can define the old location for each subsystem as an alias for the location name of the group. Remote applications that refer to the old location names do not need to change.

Use the Print Log Map utility to print all location alias names that are defined for a DB2 subsystem.

You can set up multiple server location aliases as locations on the z/OS requester to restrict which members an application will use when accessing a data sharing group. The z/OS requester must be using the IPLIST or LULIST table to route connections to the data sharing group.

**Related concepts:**

 [SYSIBM.LUNAMES \(DB2 Data Sharing Planning and Administration\)](#)

**Related tasks:**

Defining the DB2 subsystem to VTAM

Using the change log inventory utility to update the BSDS

**Choosing a password for the local subsystem**

Choosing a VTAM password is optional. DB2 does not require you to use a password as long as you have not included one in the VTAM APPL statement.


**Procedure**

To set a local subsystem password:

Enter the password by using the PRTCT option of the VTAM APPL statement. The password can have from one to eight EBCDIC characters.

This password is not transmitted through the network, so there is no need to share the password with the other systems.

**Related tasks:**

 [Controlling LU attachments to the network \(Managing Security\)](#)

**Names that you need from the remote systems**

If you plan to have your DB2 subsystem request data from other systems, you need the LU names and location names for those serving systems.

*Location names and LU names:* When you populate the communications database (CDB) in the local DB2, you must know the location names (or DRDA RDBNAMs) and LU names of remote servers. The remote servers are the systems from which this DB2 system is to request data. The local DB2 system does not need location names of requesters. However, you need to know the LU names of the requesters if you intend to change default communication options.

DB2 does not receive DRDA RDBNAM from requesters other than DB2 for z/OS. If DB2 does not have an RDBNAM, it displays LU names in messages, display output, and trace output. To help you distinguish between location names and LU names in those cases, the LU name is enclosed in less-than (<) and greater-than (>) brackets.

When your systems begin communicating, you and others involved in working with distributed systems need to be aware of the LU name to DRDA RDBNAM mappings. When you have obtained the necessary names, enter them in the CDB.

**Transaction program names (TPNs):** If a server is not a DB2 for z/OS, it might have an additional name that uniquely identifies it. In LU 6.2, this is known as a *transaction program name* (TPN), and can be from 1 to 64 characters long. When a DB2 for z/OS subsystem communicates with other DB2 for z/OS subsystems, you do not need to supply TPN values. The DB2 subsystems automatically choose the correct TPN values.

**When a TPN is necessary:** You might need to supply TPN values when a DB2 subsystem requests data from a server that is not a DB2 for z/OS subsystem. For cases where the server does not accept the default TPN for DRDA access, enter into your CDB the TPN chosen by that server. For DB2 for VM, for example, the TPN is the SQL database machine ID.

**TPN values accepted by DB2 for z/OS:** A requester that is not DB2 for z/OS must use either the TPN name X'07F6C4C2' or DB2DRDA, which are the only values DB2 recognizes when it accepts a request from another system. Some requesters enter the TPN as two separate fields: a 1-byte prefix (X'07') and a 3-byte suffix ('6DB').

**Related tasks:**

Populating the communications database for use with TCP/IP

**Names that Spiffy Computer Company chose**

Spiffy has chosen location names and LU names, some of which are used in the provided examples.

*Table 163. Spiffy's location names, LU names, and transaction program names (TPNS)*

Location Name	LU Name	TPN	Comments
USIBMSTODB21	LUDB21		DB2 *
USIBMSTODB22	LUDB22		DB2
USIBMSTOSQL1	LUSQLDS	TPNSQLDS1	DB2 for VM production system
USIBMSTOSQL2	LUSQLDS	TPNSQLDS2	DB2 for VM test system

**Note:** \*USIBMSTODB21 plans to accept requests from many Windows requesters.

**Defining the DB2 subsystem to VTAM**

You need to use an APPL definition statement and a MODEENT macro to define the DB2 subsystem to VTAM. Samples of both the APPL and MODEENT macros are in the DSN8VTAM sample data set.

**The APPL statement**

A VTAM APPL definition statement defines the VTAM options for the DB2 subsystem and includes it in a major node.

With VTAM, you can use a model application program definition for DB2. With a model definition, you use wild card characters for the application name (LU name).

Spiffy uses the statement in the table below for the USIBMSTODB21 DB2 subsystem:

```

LUDB21 APPL      APPC=YES,                X
                  ATNLOSS=ALL,           X
                  AUTH=(ACQ),            X
                  AUTOSES=1,             X
                  DMINWNL=25,            X
                  DMINWNR=25,            X
                  DSESLIM=50,            X
                  MODETAB=DB2MODES,      X
                  PRTCT=D02DN,          X
                  SECACPT=ALREADYV,      X
                  SRBEXIT=YES,           X
                  SYNCLVL=SYNCPT,        X
                  VERIFY=NONE,           X
                  VPACING=2

```

Figure 121. Example of a VTAM APPL definition statement

For your convenience, the APPL statement example is provided in data set DSN8VTAM, in the sample library, SDSNSAMP.

The topics that follow describe the APPL options that Spiffy uses and a few more in which you might be interested. Not all APPL options are described.

**Related reference:**

 [VTAM Application Program Major Node \(SNA Resource Definition Reference\)](#)

**Options for which you must choose values:**

For some options in your APPL statement, you must supply a specific value; for others, DB2 suggests values that are not the VTAM default values.

In your APPL statement, you must code values for the following options:

***name***

The 1 to 8 character LU name you chose. For their USIBMSTODB21 DB2 system, Spiffy uses LUDB21.

**AUTOSES**

The number of contention winner sessions that VTAM is to activate automatically between this DB2 and another system on a given mode before DB2 requests a conversation to be created.

Contention occurs when two LUs want to allocate a conversation at the same time in the same session. In order to resolve contention situations, VTAM denotes one LU as the contention winner and one as the contention loser. The winner automatically prevails and is allowed to allocate its conversation. The loser must wait to allocate its conversation.

The default is 0. The suggested value is 1 or greater to ensure that VTAM informs DB2 if a session is inactivated.

Too large a number can take up storage and create resources that are not used. A small number can result in a one-time delay to bring up additional sessions when they are needed by an application.

**DMINWNL**

The minimum number of parallel sessions in which, if there is contention for a conversation, this local DB2 subsystem is the winner.

The suggested value is one-half the value of DSESLIM, described below.



**DMINWNR**

For the same situation as described for DMINWNL, the number of sessions in which the remote system is the winner. The suggested value is one-half the value of DSESLIM, described below.

**DSESLIM**

The default maximum number of sessions allowed for this DB2 subsystem as it communicates with any other system on a given mode. For performance reasons, the DB2 suggested value for DSESLIM is the maximum number of sessions that can possibly be in use on any mode. For example, assume you have 5 modes for which the following maximum numbers of sessions could be active: 10, 12, 20, 30, 40. In this case, DSESLIM should be 40.

Because calculating a precise value for this number can be rather difficult if you do not know exactly how many applications run on a specific mode, Spiffy chooses 50. They can modify this option later if they have problems obtaining enough sessions, or if they find they are requesting sessions that they never need.

You can use DSESLIM to control the number of sessions that this subsystem can issue or receive. For example, to avoid overloading this subsystem with requests from remote application processes, you can assign a low number to DSESLIM to limit the number of simultaneous remote requests issued by a given partner and mode.

Use the CONVLIMIT column of the LUMODES table in the CDB to override this value for specific cases.

**MODETAB**

The name of the VTAM logon mode table you use to define DB2 session modes. Only modes defined in this table are eligible for conversations created by the local DB2. If you leave this blank, DB2 uses the default mode table shipped with VTAM (ISTINCLM). Spiffy decides to set up a separate mode table and chooses the name DB2MODES. DB2 cannot use either the default mode table or the one you set up yourself until you make entries into the table.

**PRTCT**

If you decided to use a password, this is that password. Later, you must store the same password in the bootstrap data set (BSDS), entering it through installation panels or the change log inventory utility.

If you prefer not to use a password, omit this option. The installation panels and the change log inventory utility do not require you to enter a password.

**SECACPT**

The level of conversation-level security allowed.

**Recommendation:** Use ALREADYV, which gives you the most flexibility in determining your security. You can use the CDB to determine levels of security on a more granular basis.

In general, SECACPT=CONV should not be used because in many cases, it does not allow already verified conversations for DRDA access.

**VERIFY**

Whether you want SNA partner LU verification. The default, VERIFY=NONE, means that any system can connect with yours. Because Spiffy is setting up a small, restricted network, it chooses the default for now.

Use `VERIFY=REQUIRED` to activate partner LU verification. This means that you let RACF and VTAM check the identity of an LU that is attempting to connect with yours.

DB2 has no dependency on the value you choose.

#### **VPACING**

The maximum number of messages that another system can send to this local DB2 subsystem during a conversation before waiting to receive a pacing response. The suggested value is 2.

These message sizes are determined by the `RUSIZES` option of the `MODEENT` macro. `VPACING` and `RUSIZES`, together with some overhead, determine the amount of storage required for the pacing window.

#### **Related concepts:**

CNOS processing in DB2


Session-level pacing

The `MODEENT` macro

#### **Related tasks:**

Calculating session limits

Update `SYSIBM.LUMODES` with conversation limits

 [Controlling LU attachments to the network \(Managing Security\)](#)

#### **Related reference:**

 [LU 6.2 Security \(SNA Network Implementation Guide\)](#)

#### **Options that you must code exactly as given:**

In some cases, DB2 requires particular values of APPL options.

For the following options, you must code the values exactly as shown; they are *not* the VTAM defaults:

#### **APPC=YES**

Tells VTAM that DB2 uses APPC conversation verbs.

#### **AUTH=(ACQ)**

Determines the DB2 system authority to use certain VTAM functions.

#### **SRBEXIT=YES**

Tells VTAM that DB2 uses service request block (SRB) processing in its exit routines.

#### **SYNCLVL=SYNCPT**

Tells VTAM that DB2 supports two-phase commit. Other systems communicating with this DB2 use this indication to determine if DB2 supports the updating of many locations in one unit of work.

Coding `SYNCLVL=SYNCPT` does not preclude the support of partner LUs that do not support two-phase commit. DB2 still supports the non-two-phase process.

#### **Options that must use VTAM defaults:**

Some options in your APPL statement require you to use the VTAM default values. You do not need to code these options.

DB2 must use the VTAM default values for the following options:

**HAVAIL=NO**

Indicates whether an XRF session can be supported. DB2 requires the default, NO.

**PARSESS=YES**

Specifies that parallel sessions are allowed. This defaults to YES when APPC=YES.

**ENCR=NONE**

Specifies information about specific cryptographic requirements. There is no support for encryption in this release of VTAM for LU 6.2 applications; therefore, this must be NONE.

**SONSCIP=NO**

Specifies information about SCIP exit routines. DB2 does not have SCIP exit routines; this must be NO.

**VTAMFRR=NO**

Specifies whether a VTAM functional recovery routine is in effect when control is returned to DB2. DB2 uses its own recovery routines; this must be NO.

**Other options of interest:**

In most cases, you can reasonably use the VTAM default values for the APPL statement at first.

You can change these values later. The options are listed below in case you have some reason to not use the default values.

**ACBNAME**

The LU name for the DB2 subsystem. If the ACBNAME is different from the APPL name and both the originating and destination LUs are in the same VTAM domain, do not refer to the ACBNAME in a CDB definition. If the ACBNAME is not the same as the APPL name, VTAM may encounter name conflicts.

**DDRAINL**

Whether the local DB2 subsystem wants to accept permission to drain its allocation requests if a change-number-of-sessions (CNOS) request is received that specifies that draining is allowed. The suggested value is the default, NALLOW (do not allow draining).

**DRESPL**

Whether the local DB2 is responsible for deactivating sessions when it receives a CNOS request specifying the local DB2 as the responsible system. The suggested value is the default, NALLOW (do not be responsible).

**EAS**

The approximate number of concurrent sessions for this DB2 subsystem. For performance reasons, it is better to estimate slightly high. The VTAM default is 509.

**LMDENT**

The number of entries to be used for a hash table of other systems. The suggested value is the approximate number of other systems in the network. In the scenario, Spiffy decides to use the default value of 19.

**MAXPVT**

The maximum additional amount of private area storage that can be used by

VTAM within the DDF address space for the session-related control blocks and messages for DB2. Specifying 0 indicates an unbounded amount; this is the VTAM default.

#### **OPERCNOS**

The ability to have a VTAM operator display and set VTAM session limits for a given LUNAME and MODENAME.

- Use `ALLOW` to enable a VTAM operator to change session limits dynamically without stopping DDF or changing the `CONVLIMIT` column of the `SYSIBM.LUMODES` table.
- Use `NALLOW`, the default, to make sure VTAM operators are not able to dynamically change session limits for DB2.

#### **Options that are ignored by DB2:**

Some options for VTAM APPL statements are not applicable to DB2. Do not code these options in your APPL statement.

The following options are not applicable to DB2 :

ASLENT	ATNLOSS	MDLTAB	SSCPFM
ASLTAB	MDLENT	POAQNAM	USSTAB

#### **The MODEENT macro**

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

This is the table that you named in the `MODETAB` option of the APPL statement.

You can create your own log mode table or add mode names to the default mode table, `ISTINCLM`, which is shipped with VTAM. If you decide to add your modes to `ISTINCLM`, you can find that table in `SYS1.SAMPLIB`.

Spiffy uses the DB2 default modes at first, but also sets up a separate mode table for modes that are used by DB2 for distributed data processing. This table can then be populated with additional modes as they are needed.

#### **Related concepts:**

The APPL statement

#### **Default VTAM modes:**

Use the `MODEENT` macro to enter each default mode into your mode table. When this table is complete, you must assemble and link-edit it into `SYS1.VTAMLIB`.

The following modes are the default modes:

- `SNASVCMG` is an optional mode. It is reserved for use by VTAM for CNOS processing and exists in the VTAM default log mode table. Because `SNASVCMG` is reserved for use by VTAM, do not enter it as a mode name in the CDB. If you have decided to set up a separate mode table for DB2, you can, if you choose, copy the `SNASVCMG` mode entry into your DB2 mode table, or just use it as it exists in the `ISTINCLM` mode table.

- IBMRDB is a recommended mode entry because it is used as a default for DRDA access whenever you do not explicitly assign a mode to a session. It does *not* exist in the default table; to use it as a default you must add it to your mode table.

**Related concepts:**

CNOS processing in DB2

**Related information:**

 User-defined tables and data filter (SNA Resource Definition Reference)

**Sample mode entries:**

The sample mode entries for IBMRDB contain some options that are necessary for dependent LUs to request VTAM sessions.

These options are listed in the following table.

COMPROT	PRIPROT	TSPROF	SECPROT
FMFPROF	PSERVIC	TYPE	

The samples in the figure below work for both dependent and independent LUs. However, if you have no dependent LUs, it is not necessary to re-assemble your existing mode table with the above options. For your convenience, a sample MODEENT is included in data set DSN8VTAM, in SDSNSAMP.

The ENCR option is ignored by LU 6.2 and is thus not included in the DB2 samples.

```
DB2MODES MODETAB
IBMRDB  MODEENT LOGMODE=IBMRDB,      DB2 DEFAULT MODE FOR APP-DIR ACC  X
        TYPE=0,                       NEGOTIABLE BIND                     X
        SSNDPAC=X'02',                 SECONDARY SEND PACING COUNT         X
        SRCVPAC=X'00',                 SECONDARY RECEIVE PACING COUNT      X
        RUSIZES=X'8989',               RUSIZES IN-4096 OUT-4096           X
        FMPROF=X'13',                  LU6.2 FM PROFILE                    X
        TSPROF=X'07',                  LU6.2 TS PROFILE                    X
        PRIPROT=X'B0',                  LU6.2 PRIMARY PROTOCOLS             X
        SECPROT=X'B0',                  LU6.2 SECONDARY PROTOCOLS           X
        COMPROT=X'50A5',               LU6.2 COMMON PROTOCOLS              X
        PSERVIC=X'0602000000000000122F00' LU6.2 LU TYPE
MODEEND
END
```

Figure 122. Sample mode entries

**MODEENT options:**

When you define your DB2 subsystem to VTAM, you can specify mode values. As you choose these values, be aware that partner systems can have different values. VTAM negotiates different values to limits that are acceptable to both systems when the session is established for the mode.

The options that are used in the MODEENT macro have the following meanings.

**name**

The *name* option (IBMDB2LM and IBMRDB in the examples) is optional and has no function in the specification of a logon mode table.

**LOGMODE**

Specifies the logon mode name that is to be used as a key for the session options in this table entry. This logon mode name corresponds to mode name columns in the CDB.

**TYPE**

TYPE=0 indicates that DB2 is using a negotiable BIND, which is required for communicating with dependent LUs.

**SRCVPAC**

Specifies the secondary receive pacing count. The DB2 suggested value is X'00'.

**SSNDPAC**

Specifies the secondary send pacing count. The DB2 suggested value is any nonzero number. Do not use 0; this turns off pacing, which can result in problems with IOBUF storage.

**RUSIZES**

Specifies the maximum length of data in bytes that can be sent and received in one *request/response unit* (RU). It is read as two numbers, each having two hexadecimal digits. The first number is for the send amount. The second number is for the receive amount. The suggested value of X'8989' means that VTAM sends a maximum of 4096 bytes ( $8 \times 2^9$ ) across at one time, but there is no limit to how much total information can be sent.

**FMPROF**

This constant specifies the function management profile that is required for LU 6.2.

**TSPROF**

This constant specifies the transmission services profile that is required for LU 6.2.

**PRIPROT**

This constant specifies the primary LU protocols that are used in LU 6.2.

**SECPROT**

This constant specifies the secondary LU protocols that are used in LU 6.2.

**COMPROT**

This constant specifies the common LU protocols that are used in LU 6.2.

**PSERVIC**

This constant specifies this LU as an LU type 6.2.

Some of the above options can have a profound effect on performance because of their impact on pacing.

The ENCR option is not included in the sample above because it is ignored by LU 6.2.

**Related concepts:**

Session-level pacing

## Populating the communications database

If you plan to use DB2 only as a server, you do not need to populate the CDB; default values are used. However, if you intend for DB2 to act as a requestor, you need to insert one row for each remote system into SYSIBM.LOCATIONS and SYSIBM.LUNAMES.

## About this task

For example, Spiffy's USIBMSTODB21 subsystem works as a server for many Windows requesters. It is not necessary for Spiffy to register all those requesters in the DB2 CDB.

You do not need to populate table SYSIBM.LULIST unless DB2 is acting as a requester of data that resides in a data sharing group.

After you populate these tables, you can write queries that access data at a remote system.

### Related concepts:

➞ Support for executing long SQL statements in a distributed environment (DB2 Application programming and SQL)

➞ SYSIBM.LULIST (DB2 Data Sharing Planning and Administration)

### Related tasks:

➞ Granting privileges to remote users (Managing Security)

## VTAM-relevant columns of the SYSIBM.LOCATIONS table

When you issue an SQL CONNECT statement, the LOCATION column of the SYSIBM.LOCATIONS table correlates the location name (or DRDA RDBNAM) with the VTAM LU name. If necessary, the location name is also correlated with the transaction program names (TPNs).

LOCATIONS has the following columns relating to VTAM:

### DBALIAS VARCHAR(128) NOT NULL

The name that is associated with the server. This name is used to access a remote database server. If DBALIAS is blank, the location name is used to access the remote database server. This column does not change database object names that are sent to the remote site using a location qualifier. Use the DBALIAS column to access data at two or more different remote locations when those remote locations have the same name. The LOCATION specifies where the database is in the network, and the DBALIAS is used to access the database server. This column does not change database object names that are executed in the application using the LOCATION. All fully qualified table names must reference the server's LOCATION name or one of its server LOCATION alias names, otherwise the SQL statement will fail because the table does not exist.

### LOCATION CHAR(16)

The unique network location name, or DRDA RDBNAM, assigned to a system, remote or local. You must provide location names for any systems that you request data from. This column is the primary key for this table. If the remote LU exists in the same VTAM domain, specify the APPL name, not the ACBNAME. DBALIAS can override this name.

### LINKNAME CHAR(8)

Identifies the VTAM attributes associated with this location. For each LINKNAME specified, you must have a row in SYSIBM.LUNAMES whose LUNAME matches the value specified in this column. Because this table is used for outbound requests, you must provide an LUNAME or your requests fail. Do not enter blanks in this column.

### TPN VARCHAR(64)

This column is used to enter a transaction program name (TPN) for SNA

conversations with non-DB2 systems. You only need to use this column if you are sending or receiving SQL requests from systems using non-default TPNs.

Spiffy's USIBMSTODB21 location wants a LOCATIONS table that looks like the following table.

*Table 164. Spiffy's LOCATIONS table*

LOCATION	LINKNAME	TPN
USIBMSTODB21	LUDB21	
USIBMSTODB22	LUDB22	
USIBMSTOSQL1	LUSQLDS	TPNSQLDS2
USIBMSTOSQL2	LUSQLDS	TPNSQLDS1

For example, add the second row with this statement:

```
INSERT INTO SYSIBM.LOCATIONS (LOCATION, LINKNAME)
VALUES ('USIBMSTODB22', 'LUDB22');
```

**A row for the local location:** You do not need a row for the local DB2 in the LUNAMES and LOCATIONS tables. For example, Spiffy's USIBMSTODB21 subsystem does not require a row that shows its own LU name and location name. However, for convenience, Spiffy decides to populate one LUNAMES table and one LOCATIONS table and to duplicate them entirely at each location. As a result, each table contains a row for its own LU name or location name.

### VTAM-relevant columns of the SYSIBM.LUNAMES table

The LUNAMES table defines the security and mode requirements for conversations with other systems. Decisions about how to populate this table depend on how you intend to use DB2.

- If you use this system only as a server, DB2 can use a blank in the LUNAME column as a default. DB2 uses the values in the default row as defaults for LUs that are not explicitly defined in LUNAMES. If you do not have a row with a blank in the LUNAME column, DB2 rejects client connections that do not explicitly state a valid LUNAME. The DSNTIJSJG installation job creates the default row in table SYSIBM.LUNAMES.
- If this DB2 requests data from other systems, you need to provide LU names for those systems. If the remote LU exists in the same VTAM domain, specify the APPL name, not the ACBNAME.

The LUNAMES table has the following columns:

#### LUNAME CHAR(8)

The LU name of the remote system. The default of 8 blanks indicates that this row is used for serving the requests of any system that is not specifically listed in the LUNAMES table. For example, because USIBMSTODB21 acts strictly as a server for many Windows requesters, Spiffy leaves the LUNAME column blank for those requesters and uses default values for the entire row.

However, you must provide LU names for any remote system that uses different values from the defaults.

#### SYSMODENAME CHAR(8)

This column is ignored for DRDA access conversations.



### SECURITY\_IN CHAR(1)

Defines the security options that are accepted by this DB2 subsystem when an SNA client connects to DB2. The default, A, means that an incoming connection request is accepted if it includes any of these:

- A user ID
- A user ID and password
- A user ID and RACF PassTicket
- A Kerberos security ticket.

### SECURITY\_OUT CHAR(1)

Defines the security option that is used when local DB2 SQL applications connect to any remote server associated with this LUNAME. The default, A, means that outgoing connection requests contain an authorization ID without a password.

### ENCRYPTPSWDS CHAR(1)

For now, Spiffy uses a blank to indicate no encryption of passwords.

### MODESELECT CHAR(1)

Determines whether to use the default mode or to choose a mode from the MODESELECT table. Spiffy uses a blank to use the default IBMRDB mode for conversations using DRDA access.

### USERNAMES CHAR(1)

This column is used for inbound and outbound requests to control authorization ID translation.

Spiffy uses a blank to indicate that no authorization IDs are translated, and also that no passwords are sent to the server.

### GENERIC CHAR(1)

A Y in this column indicates that a generic LU name is to be used for CNOS processing and SQL requests sent to the partner LU. A value of N or a blank indicates that the name specified in the LUNAME column is to be used.

Spiffy's USIBMSTODB21 location wants a LUNAMES table that looks like the following table.

*Table 165. Spiffy's SYSIBM.LUNAMES table.* The row of blanks is a default row that Spiffy intends to use for Windows requesters in its initial testing.

LUNAME	SYSMODENAME	USERSECURITY <sup>1</sup>	ENCRYPTPSWDS	MODESELECT	USERNAMES
LUDB21					
LUDB22					
LUSQLDS					
(blanks)					

**Note:**

1. USERSECURITY refers to SECURITY\_IN AND SECURITY\_OUT

Spiffy can use an SQL INSERT statement to add the appropriate rows. For example, they add the LU name for USIBMSTODB22 with this statement:

```
INSERT INTO SYSIBM.LUNAMES (LUNAME)
VALUES ('LUDB22');
```

**Related concepts:**

[↗](#) SYSIBM.LUNAMES (DB2 Data Sharing Planning and Administration)

**Related tasks:**

Associating applications with modes

**Related reference:**

[↗](#) SYSIBM.LUNAMES columns (Managing Security)

[↗](#) SYSIBM.USERNAMES columns (Managing Security)

**VTAM-relevant columns of the SYSIBM.USERNAMES table**

SYSIBM.USERNAMES contains information that is needed for outbound and inbound ID translation and also for “come from” checking.

**Related reference:**

[↗](#) SYSIBM.USERNAMES columns (Managing Security)

## Starting VTAM to use DB2

You do not need to code any special VTAM start options to use DB2, but you can tailor start option values for DB2 communications.

### About this task

You must start VTAM before starting DDF.

Two VTAM libraries must contain definitions for DB2:

- SYS1.VTAMLST contains the definitions that define DB2 as a VTAM application.
- SYS1.VTAMLIB contains mode table definitions used by DDF. This must be an APF-authorized library, or in a concatenation of APF-authorized libraries.

### Procedure

To enable VTAM to use DB2:

You can use the following VTAM command, assuming that the member DB2APPLS contains definitions for DB2:

```
V NET,ACT,ID=DB2APPLS
```

**Related concepts:**

The MODEENT macro

**Related tasks:**

[↗](#) Starting the Domain (SNA Network Implementation Guide)

Defining the DB2 subsystem to VTAM

**Related reference:**

[↗](#) VTAM Start Options (SNA Resource Definition Reference)

## Tuning the VTAM system

As you begin testing with the DB2 distributed data facility, you probably need to modify VTAM options and CDB values to handle certain potential problems.

### About this task

You should consult a VTAM communications expert to tune your network. Consider the following tasks when tuning VTAM for DDF.


- Controlling buffer storage  
By sending large amounts of data through the network, DB2 can cause problems with your VTAM I/O buffer pool.
- Controlling pacing  
You probably need to tune your pacing options if your VTAM buffers become overloaded with data that is sent to this local DB2.
- Modifying default session limits  
Consider modifying session limits if you have problems obtaining enough sessions to handle your distributed workload efficiently.
- Modifying class of service  
Specifying a class of service can help you assign priorities to your network applications.
- Associating applications with modes  
Tuning the system can require that you add new modes to your log mode table so that there is a greater variety of classes of service available for your sessions. This variety allows you to have more flexibility in tuning the system for specific uses. This topic tells you how to associate specific sessions with modes.

Before you begin tuning the network, you must understand the relationship between VTAM options and associated values in the CDB for DB2. The table below summarizes the relationship.

Table 166. Relationship between the CDB for DB2 and VTAM macros

Macro Name	Option	CDB table.column	Relationship
APPL	<i>name</i>	LOCATIONS.LINKNAME LUNAMES.LUNAME LUMODES.LUNAME MODESELECT.LUNAME USERNAMES.LINKNAME LULIST.LINKNAME	The LU name used in VTAM communication. This name maps 1:1 to the system's location name in LOCATIONS.
APPL	DSESLIM	LUMODES.CONVLIMIT	CONVLIMIT overrides session limits specified with DSESLIM. Session limit values are used in CNOS processing.
MODEENT	LOGMODE	LUMODES.MODENAME	LUMODES creates session limits for <i>specific</i> LU name and mode name combinations.
MODEENT	LOGMODE	MODESELECT.MODENAME	MODESELECT maps authorization IDs and plans to specific modes.

#### Related tasks:

 Improving performance for applications that access distributed data (DB2 Performance)

### Controlling buffer storage

VTAM uses buffer pools for control blocks, network traffic data, and channel programs. A shortage of buffer pools can have an adverse effect on VTAM CPU time, storage consumption, and the ability to serve DB2 requests.

### Procedure

To control buffer storage:

- Monitor VTAM buffer pools by using one of the following methods:

- The VTAM command DISPLAY NET,BFRUSE
- A VTAM trace, obtained by entering the following z/OS MODIFY command:  
`F procname,TRACE,TYPE=SMS,ID=VTAMBUF`  
*Procname* in the command is the VTAM start procedure name. The data is collected by the generalized trace facility (GTF).
- Use any of the following methods to prevent shortages of these VTAM buffers (IOBUFs):

#### **Increase the number of IOBUF buffers**

The IOBUF pool definition is one of the VTAM start options. You can enter the IOBUF option from the z/OS console, or you can include it at VTAM startup in SYS1.VTAMLST in member ATCSTRxx.

Tuning the IOBUF pool encompasses both base allocation and dynamic expansion values. At installation, you can specify a base allocation for the IOBUF pool (in number of buffers) and a dynamic expansion (in number of buffers). When storage runs short in the buffer pool, VTAM temporarily expands the IOBUF pool by the dynamic expansion value, based on a trigger which you can also specify in VTAM definitions. Recommendation: Set a maximum size for the IOBUF pool size using the *xpanlim* start option for the buffer pool. If you turn off pacing accidentally, *xpanlim* prevents DB2 from causing VTAM to grab unlimited amounts of storage.

#### **Decrease the session level pacing count**

Pacing is vital for controlling the potentially large amounts of data that are transferred around the network.

#### **Decrease the number of concurrent conversations**

You can reduce the number of concurrent conversations by reducing the number of sessions.

#### **Decrease the request unit (RU) size**

The RUSIZES option is part of the mode entry statement.

Because reducing the number of sessions and the RUSIZES value can adversely affect performance, you should first consider increasing IOBUF buffers and decreasing the session pacing count.

#### **Related concepts:**

Session-level pacing

The MODEENT macro

#### **Related tasks:**

Calculating VTAM I/O buffer pool (IOBUF) storage

#### **Related reference:**

 [Buffer pools \(SNA Network Implementation Guide\)](#)

### **Session-level pacing**

*Session-level pacing* is the mechanism by which the receiver of data (DB2, in this case) can control the pace at which the sender sends data (in the form of RUs).

The pacing size is the number of RUs that VTAM sends across the line at one time, and you can set that value by using the VPACING option of the VTAM APPL

definition statement. You set the RU size in the MODEENT macro. The receiving VTAM stores these RUs in its IOBUF pool; it uses pacing so that its buffers do not become flooded with data.

The pacing process works as shown in the following figure. The system at the sending side (assume it is USIBMSTODB22) passes data to its VTAM system. VTAM formats the data into RUs and sends those RUs across the network. If, for example, the pacing size is 2, then it sends two RUs. A 29-byte network header is sent with each RU.

After the USIBMSTODB22 VTAM system sends the specified number of RUs, it does not send any more data on this session until it receives a pacing response from the VTAM system at USIBMSTODB21. The USIBMSTODB21 VTAM system does not send a response until VTAM transfers the data into the DB2 buffers.

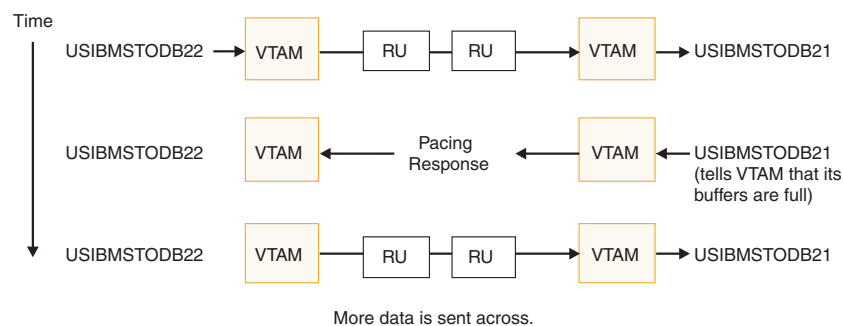


Figure 123. How pacing works

Although it is generally true that the receiving system can control inbound pacing, both communicating systems negotiate final pacing values.

**Related concepts:**

- The APPL statement
- The MODEENT macro

**Related reference:**

[Session-level pacing \(SNA Network Implementation Guide\)](#)

**Recommendation for APPL pacing option:**

The VPACING option of the APPL statement determines the maximum number of RUs that another LU can send, on a session, to this LU. When the maximum number of RUs is sent, the other LU waits to receive a pacing response.

Specify a nonzero value for this option unless you want to turn off all pacing for all sessions that are affected by this option.

**Recommendation:** Start with a value of 2 for both communicating systems. This pacing size is the same in both directions for all modes.

The VPACING value is used with the RUSIZES option of the MODEENT macro to control the pacing window size. Thus, if VPACING is 2 and RUSIZES is 4-KB (X'8989'), then about  $2 \times 4\text{KB} = 8\text{KB}$  are sent before waiting to receive a pacing response. You should verify that your VTAM buffer pools are large enough to accommodate the chosen pacing and RU sizes.

**Related tasks:**

Calculating VTAM I/O buffer pool (IOBUF) storage

**Recommendation for MODEENT pacing options:**

The MODEENT macro contains several pacing options.

**PSNDPAC**

This does not apply to DB2; therefore, you can ignore this option.

**SSNDPAC**

This option is really a flag that you set to either 0 (off) or nonzero (on). When 0, outbound pacing for sessions is disabled, which can lead to severe problems with IOBUF storage.

**Recommendation:** Specify a nonzero value for this option.

**SRCVPAC**

If 0, which is the recommended value, the VPACING option of the VTAM APPL statement controls both the send and receive pacing for all sessions in all modes. A value of 0 makes it easier for you to predict pacing results and makes it easier to maintain your pacing definitions.

If nonzero, VPACING controls pacing in one direction, and SRCVPAC controls it in another. LU 6.2 protocols make it difficult to predict which option is in control at any given time.

**Related concepts:**

The MODEENT macro

**Modifying class of service**

You can define the transmission priority and paths between systems with entries in a class of service (COS) table.

**About this task**

Each entry in the table is associated with a list of routes to be used with a particular class. For example, you might want to place interactive sessions on a faster route than a batch job.

**Procedure**

To specify a class of service for a specific mode:

Use the COS option of the MODEENT macro. When you specify a name of a COS entry in the mode description, you select the list of routes that you want to be used for the session. When VTAM establishes the session, it chooses the first available route in the list of routes that you tell it to use for that class. If you do not specify a COS name, the mode gets the default list of routes from VTAM.

**Associating applications with modes**

As you tune your system, you can assign certain applications, such as a high-priority job, to the mode that is best suited for that job.

**About this task**



You can also use a specific mode assignment for an application that uses many conversations. You can assign such an application to a mode that allows more conversations than the VTAM DSESLIM value you entered in the APPL statement.

To associate a specific mode with a particular session, you need to update or insert rows into three tables in the CDB: LUNAMES, LUMODES, and MODESELECT.

#### GUPI

##### **Related concepts:**

When updates to CDB values take effect for VTAM connections

##### **Update LUNAMES to associate modes with LU names:**

The LUNAMES table associates a mode with each remote system that the local subsystem can send a query to.

##### **About this task**

#### GUPI

You can specify the following type of connections in this table:

##### **SQL processing conversations**

For DRDA access, an SQL processing conversation is established. The mode name for SQL processing conversations is determined by the MODESELECT table of the CDB. If the MODESELECT column of LUNAMES table is blank or contains N, then the default mode (IBMRDB) is used. If it contains a Y, then MODESELECT is searched.

#### GUPI

##### **Related tasks:**

Populating the communications database for use with TCP/IP

##### **Update SYSIBM.LUMODES with conversation limits:**

Use SYSIBM.LUMODES to provide VTAM with conversation limits for specific LU name and mode name combinations.

##### **About this task**

#### GUPI

Populating SYSIBM.LUMODES is optional; if you do not specify mode names in this table, the VTAM defaults are used. The table is unlike the DSESLIM option of the VTAM APPL definition statement, which provides the default session limits for *all* LU name and mode name combinations. The primary key for this table is formed by the LU name and mode name combination. Only one entry with the same LU name and mode name is allowed.

LUMODES is accessed for negotiation of session limits with a remote DB2 for a specific mode. This negotiation is called *change number of sessions* (CNOS).

### Example

For example, suppose Spiffy wants to allocate 75 sessions instead of 50 (the value in DSESLIM) for conversations to USIBMSTODB22, using the mode named LOC2MODE. They can use the INSERT statement below to update the value in the CONVLIMIT column to 75. The new session limit takes effect the next time DDF is started, or in the initial connection to this LU for this mode.

```
INSERT INTO SYSIBM.LUMODES VALUES ('LUDB22','LOC2MODE',75,'N');
```

CNOS processing negotiates a value that is the lesser of the number of sessions available at either system for that mode. Therefore, USIBMSTODB22 must also increase its CONVLIMIT value to derive any benefit from the added sessions.

### Columns of the LUMODES table:

#### LUNAME CHAR(8)

Again, this is the LU name of the other system. This column is a foreign key of the LUNAMES table; thus, all LU names defined in this table must be defined in LUNAMES. When you delete an LU name from the LUNAMES table, all associated rows in LUMODES are deleted.

#### MODENAME CHAR(8)

The name of the logon mode description in the VTAM logon mode table that VTAM uses when creating a conversation to support the request from the local DB2 for data from another system. The mode named here must exist in the mode table used by DB2 before a conversation can be created between USIBMSTODB21 and USIBMSTODB22.

#### CONVLIMIT SMALLINT

The maximum number of conversations to be concurrently active between this DB2 subsystem and the other system for this mode. This number overrides the number in the DSESLIM option of the VTAM APPL definition statement during CNOS processing..



### Related concepts:

CNOS processing in DB2

### Update SYSIBM.MODESELECT to associate plans with modes:

SYSIBM.MODESELECT correlates authorization IDs and plan names with mode names. The primary key for this table is the combination of AUTHID, LUNAME, and PLANNAME.

### About this task



Only one entry with the same AUTHID, LUNAME, and PLANNAME is allowed.



Use this table to make sure that certain authorization IDs using certain plans always have a predefined class of service suited for that operation. For example, the USIBMSTODB21 location might want to work with USIBMSTODB22 to set up a high performance mode for DBADM to run queries to USIBMSTODB22. After the following statement is committed, all subsequent threads to USIBMSTODB22 use mode DB2MODE1 to process SQL processing conversations:

```
INSERT INTO SYSIBM.MODESELECT VALUES ('DBADM',' ','LUDB22','DB2MODE1');
```

Populating this table is optional. If the remaining columns are blank for any given LU name, then the mode name applies to all authorization IDs for all PLANNAMEs accessing the given LU name.

*Columns of the MODESELECT table:*

**AUTHID CHAR(8)**

The authorization ID of the request for data from another system. A blank AUTHID indicates that the specified mode name applies to all authorization IDs. Blank is the default.

**PLANNAME CHAR(8)**

The plan name associated with the request for data from another system. A blank plan name indicates that the specified mode name applies to all plan names. Blank is the default.

**LUNAME CHAR(8)**

The LU name to which the specific mode name applies. This column is a foreign key of the LUNAMES table; therefore, all LU names defined in this table must be defined in LUNAMES.

**MODENAME CHAR(8)**

The name of the logon mode description in the VTAM logon mode table that is used when creating a conversation to support the request for data from another system. If this column is blank, the default mode (IBMDB2LM or IBMRDB) is used.

*How an SQL processing conversation mode is chosen:*

The MODESELECT table of the CDB is used to choose a mode for an SQL processing conversation (if the MODESELECT column of the LUNAMES table contains Y for this LU name). The table below shows the search order of the MODESELECT table.

*Table 167. Precedence search order for MODESELECT table of CDB*

<b>AUTHID</b>	<b>PLANNAME</b>	<b>Result</b>
Name	Name	The MODENAME applies to the named AUTHID for the named PLANNAME accessing the named LU.
Name	Blank	The MODENAME applies to the named AUTHID for all PLANNAMEs accessing the named LU.
Blank	Name	The MODENAME applies to all AUTHIDs for the named PLANNAME accessing the named LU.
Blank	Blank	The MODENAME applies to all AUTHIDs for all PLANNAMEs accessing the named LU.

If the MODESELECT column of the LUNAMES table contains Y for a particular LU name and no row is found for that LU name in the MODESELECT table, then you receive a negative SQL return code when trying to access the system at that LU.

*Plan name for remote bind operations:* If you want to specify a particular mode for remote bind operations, use the plan name DSNBIND in MODESELECT.



## When updates to CDB values take effect for VTAM connections

Any table in the CDB can be updated while DDF is active.

The changes take effect as follows:

- Changes to LUMODES take effect the next time DDF is started, or on the initial session to a given LUMODE combination.
- Changes to LUNAMES, LOCATIONS, and LULIST take effect as follows:
  - If DDF has not yet tried to communicate with a particular remote location, rows added to LUNAMES and LOCATIONS take effect when DDF attempts to communicate with that location.
  - If DDF has already attempted communication with a particular location, rows added to LUNAMES and LOCATIONS take effect the next time DDF is started.
- Changes to USERNAMES and MODESELECT take effect at the next thread access.

In all cases, existing conversations continue to operate as the table specified before the update.

The process of modifying the CDB, particularly MODESELECT and USERNAMES, can interfere with DDF's access to the tables. This could potentially cause deadlocks and timeouts, which cause the attempted access to the remote system to fail.

## Calculating session limits

You can calculate session limit values for DRDA access.

### About this task

You might have to derive a precise figure for your session limits (DSESLIM). For example, if you specify a very large number for your session limits and you are running short of space, it might help to calculate a number closer to what you actually need.

### Procedure

To calculate the session limit for a specific mode:

For DRDA access, determine the maximum number of concurrently active applications that use the mode to and from the remote system.

## Example

For example, suppose location A has a maximum of 3 DRDA access applications that can run concurrently on Mode1 to other locations. Also suppose that a maximum of 10 DRDA access applications can be incoming to location A on Mode1. In this case, Mode1 should support 13 sessions for DRDA access applications.

## Calculating VTAM I/O buffer pool (IOBUF) storage

You can estimate VTAM buffer pool storage when you use the distributed data facility of DB2. Every *path information unit* (PIU) that enters or leaves VTAM resides in one or more IOBUF buffers.

## About this task

A PIU is composed of a 26-byte transmission header, a 3-byte request/response header, and the request/response unit (RU) that contains VTAM application data. You define the length of the RU in a mode entry, using the RUSIZES option.

## Procedure

To calculate the maximum number of buffers that are required for the local DB2 subsystem:

1. Calculate the number of buffers that each PIU occupies, and call it PIUBUF.

$$\text{PIUBUF} = \text{CEILING}((29 + \text{RUSIZE}) / \text{BUFSIZE})$$

RUSIZE is the length of the RU in bytes. It is assumed to be the same for both session directions. BUFSIZE is the value you specified in the IOBUF pool definition.

Assume you have a buffer size of 441 bytes, and an RUSIZE of 4096. With these values, PIUBUF would be 10  $((29+4096) / 441, \text{rounded up})$ .

For channel-to-channel (CTC) and NCP connections, you need to be concerned with the VTAM MAXBFRU value. For CTC connections, MAXBFRU is the number of 4KB buffers allocated to hold the PIUs sent over the channel. If your RU size is 4096 and you allow 29 bytes for the header, then you need to allocate at least 2 4KB buffers. Thus, you need a MAXBFRU value of at least 2.

When you route data through NCP, MAXBFRU is the number of VTAM IOBUF buffers allocated to hold the PIUs sent to the NCP, which means MAXBFRU must be at least as large as PIUBUF.

2. Calculate the maximum number of IOBUF buffers used by a session, and call it SESSBUF.

$$\text{SESSBUF} = \text{PACECNT} \\ \times \text{PIUBUF}$$

PACECNT stands for pacing count. For this example, assume that pacing is the same in both directions, and it is the same for all modes.

If pacing is set to 2, then SESSBUF is 20.

3. Calculate the maximum number of sessions that can be active for all modes to all systems and call it SESCNT. Calculate the maximum for each mode, then add those results to get SESCNT.

4. Calculate the maximum number of VTAM buffers used by DB2, and call this DB2BUF. The formula for DB2BUF is based on a worst case scenario, because it assumes that all sessions are used by concurrent conversations.

$$\text{DB2BUF} = \text{SESCNT} \\ \times \text{SESSBUF}$$

If you assume that the maximum number of sessions that can be active is 50 (SESCNT), then 1000 is the number of IOBUF entries required by DB2 in a worst case scenario.

5. Calculate actual VTAM buffer storage consumption used by DB2, and call it STORAGE.

$$\text{STORAGE} = \text{DB2BUF} \\ \times (\text{BUFSIZE} + 71)$$

Each buffer includes 71 bytes for VTAM internal headers.

So, to continue the above example, an upper value of real storage is estimated as follows:

$$1000 \\ \times (441 + 71) = 500\text{KB}$$

**Related concepts:**

Session-level pacing

Definitions for channel-connected DB2 subsystems

NCP-connected DB2 subsystems

**Related tasks:**

Calculating session limits

## CNOS processing in DB2

The distributed data facility of DB2 can request to alter the number of sessions with another system for a specific VTAM logon mode. This automatic process is called *change number of sessions* (CNOS).

This topic contains a brief overview of the process as it relates to DB2; it should help you understand the messages that CNOS processing generates.

**When sessions are started:** The AUTOSES option of the VTAM APPL determines whether, and how many, sessions are started at the time CNOS is negotiated. If AUTOSES is 0, then the sessions are not started at CNOS negotiation time; they are started as they are needed. AUTOSES should generally not be 0, because then DB2 is not informed if CNOS fails, and you receive a “resource unavailable” SQL code with the first SQL request to the remote system.

If AUTOSES is not 0, then sessions are started as follows:

- If AUTOSES is equal to or less than the number of contention winner sessions for a specific DB2 subsystem, then the number of sessions that are automatically started at CNOS negotiation is equal to AUTOSES.
- If AUTOSES is greater than the number of contention winner sessions for a specific DB2 subsystem, only the contention winner sessions are automatically started at CNOS negotiation.

Each LU has its own value for the number of contention winner sessions to start. The total number of sessions started on behalf of a CNOS negotiation request is the sum of the sessions started at each site.

**Example:** Suppose the DB2 subsystems at USIBMSTODB21 and USIBMSTODB22 have the following values in their VTAM APPL statements and LUMODES tables:

USIBMSTODB21 APPL Values	
DSESLIM	50
DMINWNL	25
DMINWNR	25
AUTOSES	1

USIBMSTODB22 APPL Values	
DSESLIM	40
DMINWNL	20
DMINWNR	20
AUTOSES	1

USIBMSTODB21 SYSIBM.LUMODES		
LUNAME	MODENAME	CONVLIMIT
LUDB22	SYSTOSYS	2
LUDB22	IBMDB2LM	80

USIBMSTODB22 SYSIBM.LUMODES		
LUNAME	MODENAME	CONVLIMIT
LUDB21	SYSTOSYS	2
LUDB21	IBMDB2LM	50

Figure 124. CNOS negotiation example: VTAM and DB2 definitions

Assume that USIBMSTODB21's DDF is started first. CNOS processing fails because USIBMSTODB22's DDF has not yet started, and you get a message at the console. When USIBMSTODB22's DDF is started, CNOS processing can begin.

USIBMSTODB21 sends to USIBMSTODB22 a CNOS value of 80, which is its CONVLIMIT value. However, USIBMSTODB22 replies with a value of 40 (its DSESLIM value), and, as shown in the following figure, that becomes the negotiated value for the CNOS that is started by USIBMSTODB21. Both systems begin starting the number of sessions that are specified in their respective AUTOSES options.

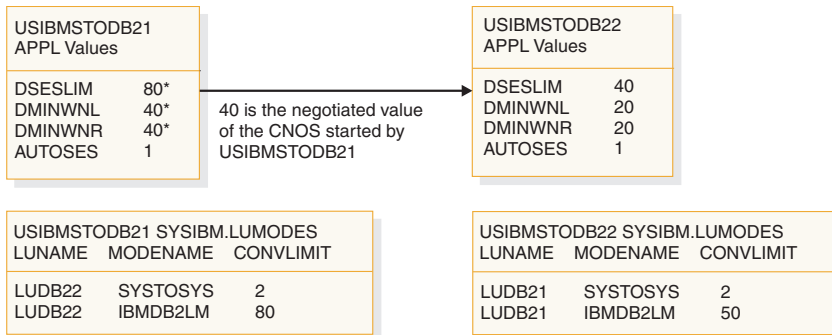


Figure 125. Result of CNOS negotiation started by USIBMSTODB21. Overridden values are noted with asterisks (\*).

VTAM does not start all 40 sessions unless the two AUTOSES values total up to 40 or greater. Instead, VTAM delays starting the other sessions until they are needed.

Everything up to this point occurred because USIBMSTODB21 issued CNOS. Now, as shown in the following figure, USIBMSTODB22 starts CNOS processing back to USIBMSTODB21 because its CDB has CNOS limits specified (50 in CONVLIMIT). USIBMSTODB21's VTAM sees that DB2 allows up to 80, so VTAM sends the CNOS reply message back to USIBMSTODB22 unchanged (50). USIBMSTODB22's CONVLIMIT value of 50 is compared with USIBMSTODB21's overridden value of 80 from the previous CNOS, and 50 is chosen as the value.

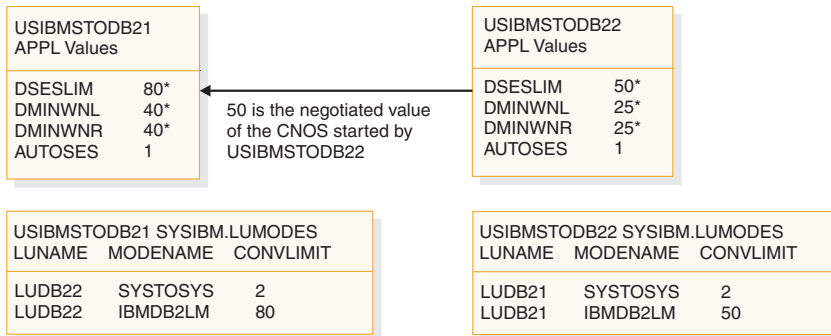


Figure 126. CNOS negotiation from USIBMSTODB22 to USIBMSTODB21. Overridden values are noted with asterisks (\*).

If the new negotiated value is smaller than the number already started by USIBMSTODB21, then VTAM terminates the number of sessions that makes up the difference. If the CONVLIMIT value at USIBMSTODB22 is 20, for example, VTAM terminates 20 sessions on behalf of the request from USIBMSTODB22 because the lowest negotiated value always wins. If a session is currently being used by a conversation, the session is terminated as soon as the conversation is deallocated.

**Related reference:**

➡ Managing Sessions (z/OS Communications Server: SNA Programmer's LU 6.2 Guide)

## Sample VTAM definitions to connect two DB2 subsystems

Sample VTAM definitions are provided to give you some guidance on setting up your network to connect two DB2 subsystems. The samples are not intended to give you information about all the options.

This set of definitions includes the basic definitions you need to connect two DB2 subsystems. Additional options for channel-to-channel and Network Control Program (NCP) connections are covered as well.

### Basic VTAM definitions

Some basic definitions are required for all VTAM connections.

These definitions are listed below.

```
*****
**      APPL STATEMENT FOR SYSTEM 1      *
*****
DB1APPL  APPL APPC=YES,                  X
          ATNLOSS=ALL,                   X
          AUTH=(ACQ),                     X
          AUTOSES=1,                      X
          DSESLIM=20,                     X
          DMINWNL=10,                    X
          DMINWNR=10,                    X
          PRTCT=DB1PWD,                   X
          SECACPT=ALREADYV,               X
          EAS=509,                        X
          MODETAB=DB2MODES,               X
          PARSESS=YES,                    X
          SRBEXIT=YES,                    X
          SYNCLVL=SYNCPT,                 X
          VPACING=2
```




```

*****
**      APPL STATEMENT FOR SYSTEM 2      *
*****
DB2APPL  APPL APPC=YES,                      X
          ATNLOSS=ALL,                       X
          AUTH=(ACQ),                        X
          AUTOSSES=1,                        X
          DSESLIM=20,                        X
          DMINWNL=10,                        X
          DMINWNR=10,                        X
          PRTCT=DB2PWD,                     X
          SECACPT=ALREADYV,                 X
          EAS=509,                          X
          MODETAB=DB2MODES,                 X
          PARSESS=YES,                      X
          SRBEXIT=YES,                      X
          SYNCLVL=SYNCPT,                   X
          VPACING=2
*****
**      LOGMODE TABLE FOR SYSTEM 1 TO SYSTEM 2 CONNECTIONS
*****
DB2MODES  MODETAB
*****
*      LU6.2 SERVICES MANAGER BASE MODE FOR APPC/VTAM
*****
SNASVCMG  MODEENT LOGMODE=SNASVCMG,          X
          FMPROF=X'13',                       X
          TSPROF=X'07',                       X
          PRIPROT=X'B0',                     X
          SECPROT=X'B0',                     X
          PSERVIC=X'060200000000000000000300', X
          COMPROT=X'D0B1',                   X
          RUSIZES=X'8585',                   X
          ENCR=B'0000'
*****
**      DB2 DEFAULT FOR SYSTEM 1 AND SYSTEM 2 DRDA ACCESS      **
*****
IBMRDB  MODEENT LOGMODE=IBMRDB,              X
          TYPE=0,                             X
          PSNDPAC=X'00',                      X
          SSNDPAC=X'02',                      X
          SRCVPAC=X'00',                      X
          RUSIZES=X'8989',                    X
          FMPROF=X'13', LU6.2 FM PROFILE      X
          TSPROF=X'07', LU6.2 TS PROFILE      X
          PRIPROT=X'B0', LU6.2 PRIMARY PROTOCOLS X
          SECPROT=X'B0', LU6.2 SECONDARY PROTOCOLS X
          COMPROT=X'50A5', LU6.2 COMMON PROTOCOLS X
          PSERVIC=X'0602000000000000122F00' LU6.2 LU TYPE
*****
**      ATCSTRTA VTAM START OPTIONS FOR SYSTEM 1, INCLUDES IOBUF
*****
          CONFIG=TA,                          X
          SSCPID=53,MAXSUBA=150,HOSTSA=53,    X
          SSCPNAME=SSCP004,NETID=USIBMSY,    X
          IOBUF=(328,441,20,,64,48,768)
*****
**      ATCSTRTB VTAM START OPTIONS FOR SYSTEM 2, INCLUDES IOBUF
*****
          CONFIG=TB,                          X
          SSCPID=54,MAXSUBA=150,HOSTSA=54,    X
          SSCPNAME=SSCP00E,NETID=USIBMSY,    X
          IOBUF=(328,441,20,,64,48,768)

```

Figure 127. Basic VTAM definitions

**Related reference:**

-  [VTAM Application Program Major Node \(SNA Resource Definition Reference\)](#)
-  [VTAM Start Options \(SNA Resource Definition Reference\)](#)
-  [VTAM Logon Mode Table \(SNA Resource Definition Reference\)](#)

**Definitions for channel-connected DB2 subsystems**

When determining your channel-to-channel definitions, remember that MAXBFRU must be large enough to handle the largest PIU.

Because DB2 is sending 4096 bytes, you need enough 4KB buffers to accept 4096 + 29 bytes (the 29 bytes is for the network header). Thus MAXBFRU must be at least 2 in our example.

In many cases, the DB2 RU size is larger than any other PIUs used on existing CTCs, which can mean you must examine your MAXBFRU values on existing CTC definitions. If the values are too small, you get an SNA X'800A' sense code, indicating that the PIU was truncated during transmission.



```

*****
**          CTC DEFINITIONS FOR SYSTEM 1          *
*****
DB1CTC  VBUILD TYPE=CA          CTC MAJOR NODE DEFINITION
DB1GRPB GROUP LNCTL=CTCA,      CTCA LINE TYPE                X
          MIH=YES,REPLYTO=10.0
DB1CTCL LINE ADDRESS=(500),    CTC ADDRESS FOR THIS LINE      X
          DELAY=0,              CTC DELAY                    X
          MAXBFRU=8,            MAX BUFFER USED                X
          ISTATUS=ACTIVE        INITIAL STATUS IS ACTIVE
DB1CTCP PU          ISTATUS=ACTIVE

*****
**          CTC DEFINITIONS FOR SYSTEM 2          *
*****
DB2CTC  VBUILD TYPE=CA          CTC MAJOR NODE DEFINITION
DB2GRPB GROUP LNCTL=CTCA,      CTCA LINE TYPE                X
          MIH=YES,REPLYTO=10.0
DB2CTCL LINE ADDRESS=(500),    CTC ADDRESS FOR THIS LINE      X
          DELAY=0,              CTC DELAY                    X
          MAXBFRU=8,            MAX BUFFER USED                X
          ISTATUS=ACTIVE        INITIAL STATUS IS ACTIVE
DB2CTCP PU          ISTATUS=ACTIVE

*****
**          PATH - NETWORK ROUTES FOR SYSTEM 1    *
*****
MVSDB2  PATH DESTSA=2,ER1=(2,1),VR1=1,          X
          VRPWS10=(2,30),VRPWS11=(2,30),VRPWS12=(2,30)
*****
**          PATH - NETWORK ROUTES FOR SYSTEM 2    *
*****
MVSDB1  PATH DESTSA=1,ER1=(1,1),VR1=1,          X
          VRPWS10=(2,30),VRPWS11=(2,30),VRPWS12=(2,30)
*****
**          CDRSC DEFINITIONS FOR SYSTEM 1        *
*****
          VBUILD TYPE=CDRSC
DB2APPL CDRSC CDRM=DB2CDRM,ISTATUS=ACTIVE
*****
**          CDRSC DEFINITIONS FOR SYSTEM 2        *
*****
          VBUILD TYPE=CDRSC
DB1APPL CDRSC CDRM=DB1CDRM,ISTATUS=ACTIVE

*****
**          CDRM DEFINITIONS FOR SYSTEM 1 AND 2 (SAME DEFINITION USED) *
*****
          VBUILD TYPE=CDRM
DB1CDRM CDRM SUBAREA=1,ISTATUS=ACTIVE,CDRSC=OPT
DB2CDRM CDRM SUBAREA=2,ISTATUS=ACTIVE,CDRSC=OPT

*****
**          ATCONTA - NETWORK CONFIGURATION LIST FOR SYSTEM 1          *
*****
DB1PATH,DB1CTC,DB1RSC,DB1APPLS,DBCDRMS
*****
**          ATCONTB - NETWORK CONFIGURATION LIST FOR SYSTEM 2          *
*****
DB2PATH,DB2CTC,DB2RSC,DB2APPLS,DBCDRMS

```

Figure 128. Channel-to-channel (CTC) definitions

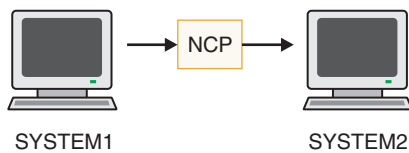
## NCP-connected DB2 subsystems

The Advanced Communications Facility/Network Control Program (ACF/NCP) is a product that you can use to generate a network control program load module. The network control program load module is loaded from the host into a communications controller.

The network control program controls the lines and devices attached to it. It transfers data to and from the devices and handles any errors that occur, including retries after line errors.

A communications controller can be locally attached to a host via a channel, or it can be link-attached to another communications controller that is channel-attached.

Our sample definitions are used for the following setup:



When you are defining your NCP connections, remember the following:

- MAXBFRU must be large enough to handle the biggest PIU that is sent to the NCP. In our example, DB2 is sending 4125 bytes per PIU (4096 + a 29-byte network header). Given an IOBUF buffer size of 441 bytes, MAXBFRU must therefore be at least 10 (10 × 441 = 4410, which is greater than 4125).
- The MAXDATA option must also be large enough to handle biggest PIU (RUSIZE + 29 bytes).

If DB2 is using existing NCP definitions, you should make sure your MAXBFRU and MAXDATA options are large enough. If these values are too small, you get an SNA X'800A' sense code, indicating that the PIU was truncated during transmission.

```

*****
*       PCCU SPECIFICATION - FOR SYSTEM 1       *
*****
PCCU1  PCCU  CUADDR=C02,          3745 BLOCK CHANNEL      X
          AUTOSYN=YES,           X
          AUTODMP=NO,            X
          AUTOIPL=NO,            X
          BACKUP=YES,            X
          DELAY=0,                X
          DUMPDS=DUMPDS,         DUMP DATA SET          X
          CDUMPDS=CDUMPDS,       CSP DUMP DATA SET       X
          MDUMPDS=MDUMPDS,       MOSS DUMP DATA SET      X
          INITEST=NO,            NO 3745 INITIAL TESTS AT LOAD TIME X
          MAXDATA=4302,          = BFRS*TRANSFR - 18      X
          OWNER=HOST1,           X
          SUBAREA=3,             HOST SUBAREA              X
          VFYLM=YES
*****
*       PCCU SPECIFICATION - FOR SYSTEM 2       *
*****
PCCU2  PCCU  CUADDR=C02,          3745 BLOCK CHANNEL      X
          AUTOSYN=YES,           X
          AUTODMP=NO,            X
          AUTOIPL=NO,            X
          BACKUP=YES,            X
          DELAY=0,                X
  
```

```

DUMPDS=DUMPDS,          DUMP DATA SET          X
CDUMPDS=CDUMPDS,        CSP DUMP DATA SET      X
MDUMPDS=MDUMPDS,        MOSS DUMP DATA SET     X
INITEST=NO,              NO 3745 INITIAL TESTS AT LOAD TIME X
MAXDATA=4302,            = BFRS*TRANSFR - 18    X
OWNER=HOST2,              HOST SUBAREA            X
SUBAREA=4,
VFYLM=YES

*****
*          BUILD MACRO SPECIFICATIONS          *
*****
ACFNCPCBD BUILD BFRS=(240),          NCP BUFFER SIZE,# EP BUFFERS    X
          BRANCH=1000,                  X
          CATRACE=(YES,10),              X
          CSMHDR=27F5C711C3F0405C40C8C4D9405C, X
          CSMHDC=40E3C5E7E3405C5C,      X
          CSMMSG=5C5C40E5E3C1D440E2C8E4E3C4D6E6D540, X
          CMSGC=6040C8C1E240C2C5C7E4D5405C5C, X
          DIALTO=60,                      WAIT 1 MIN FOR AUTOCALL ANSWER    X
          DR3270=NO,                      NO DYNAMIC RECONFIG              X
          DSABLTO=3.0,                    TIME TO DETECT DSR DROP          X
          ENABLTO=2.2,                    TIME TO DETECT DSR AFTER ENABLE  X
          LOADLIB=NCPLoad,                LIBRARY FOR ACF/NCP LOAD MODULE  X
          LTRACE=8,                       UP TO 8 LINES CONCURRENTLY TRACED X
          MAXSSCP=8,                      NUMBER OF SSCPS IN SESSION      X
          MAXSUBA=63,                     MUST BE SAME AS IN ATCSTRXX     X
          MEMSIZE=4M,                     AMOUNT OF MEMORY                X
          MODEL=3745,                     3745 MODEL 410                  X
          NETID=BCR1,                     3745 MODEL 410                  X
          NEWNAME=DDBLC0,                 LOAD MODULE NAME                 X
          PUNAME=DDB,                     X
          NPA=YES,                        NPA WILL NOT COLLECT DATA      X
          OLT=NO,                         INCLUDE ONLINE TEST FACILITY-OLTEP X
          PRTGEN=NOGEN,                   DON'T PRINT ASSEMBLED STATEMENTS X
          PWROFF=NO,                      X
          SLOWDOWN=15,                    SLOWDOWN AFTER 15% BUFFERS AVAIL X
          SUBAREA=26,                     NCP SUBAREA                      X
          TRACE=(YES,10),                 10-16 BYTE ADDRESS TRACE ENTRIES X
          TRANSFR=18,                     =(4096+51)/BFRS--ROUNDED UP    X
          TRCPIU=2000,                    SIZE OF LINE AND SIT TRACE      X
          TYPGEN=NCP,                     X
          TYP SYS=MVS,                    MVS OPERATING SYSTEM           X
          USGTIER=5,                      NCP USAGE TIER - REQUIRED        X
          VERSION=V5R3,                   X
          XBREAK=NONE

*****
**
*          SYSCNTRL OPTIONS - REQUIRED BY VTAM          *
**
*****
          SYSCNTRL OPTIONS=(ENDCALL,MODE,RCNTRL,RCOND,RECMD,RIMM, X
          SESSION,NAKLIM,LNSTAT,SSPAUSE,XMTLMT,BHSASSC,STORDSP) X
*****
HOST2  HOST  BFRPAD=0,                    VTAM REQUIREMENT FOR OS          X
          INBFRS=18,                     INITIAL BUFFERS FOR EACH RECEIVE X
          MAXBFRTU=10,                   < BASENO IN IOBUF FOR VTAM      X
          SUBAREA=4,                     X
          UNITSZ=441                      = BUFSIZE IN IOBUF FOR VTAM    X

HOST1  HOST  BFRPAD=0,                    VTAM REQUIREMENT FOR OS          X
          INBFRS=18,                     INITIAL BUFFERS FOR EACH RECEIVE X
          MAXBFRTU=10,                   < BASENO IN IOBUF FOR VTAM      X
          SUBAREA=3,                     X
          UNITSZ=441                      = BUFSIZE IN IOBUF FOR VTAM    X

```

```

*****
*          PATH STATEMENTS          *
*****
          PATH DESTSA=3,           SYS1           X
          ER4=(3,1),              SYS1
          PATH DESTSA=4,           SYS2           X
          ER4=(4,1),              SYS2
*****
*          *                         *
*  HOST 1 CHANNEL ADAPTER          *
*          *                         *
*  LINE ADDR = 0; PHYSICAL POSITION = 5. *
*****
DDBCA5  GROUP LNCTL=CA,           X
          ISTATUS=INACTIVE      STOP VTAM FROM ACT CHAN LINK

DDBL05  LINE ADDRESS=0,           X
          CA=TYPE6,             3745 CHANNEL ADAPTER TYPE X
          CASDL=120,           TIME ALLOWED TO BLOCK INBOUND DATA X
          DELAY=0,             CHAN ATTN DELAY X
          DYNADMP=NONE,        NO EP SUBCHANNELS TO DUMP X
          INBFRS=18,          # BUFS FOR EACH TRANSFER TO HOST X
          NPACOLL=YES,        NPA WILL COLLECT DATA ON CHANNEL X
          TIMEOUT=120         INTERVAL BEFORE CHANNEL DISCONTACT

DDBP05  PU  PUTYPE=5,           X
          TGN=1                INTERMEDIATE SUBAREA FUNCTION
                               MUST BE 1 FOR PUTYPE5
*****
*          *                         *
*  HOST 2 CHANNEL ADAPTER          *
*  LINE ADDR = 2; PHYSICAL POSITION = 7. *
*****
DDBCA7  GROUP LNCTL=CA,           X
          STATUS=INACTIVE      ACT CHAN LINK

DDBL07  LINE ADDRESS=2,           X
          CA=TYPE6,             3745 CHANNEL ADAPTER TYPE X
          CASDL=120,           TIME ALLOWED TO BLOCK INBOUND DATA X
          DELAY=0,             CHAN ATTN DELAY X
          DYNADMP=NONE,        NO EP SUBCHANNELS TO DUMP X
          INBFRS=18,          #BUFS FOR EACH TRANSFER TO HOST X
          NPACOLL=YES,        NPA WILL COLLECT DATA ON CHANNEL X
          TIMEOUT=120         INTERVAL BEFORE CHANNEL DISCONTACT

DDBP07  PU  PUTYPE=5,           X
          TGN=1                INTERMEDIATE SUBAREA FUNCTION
                               MUST BE 1 FOR PUTYPE5

```

Figure 129. Network control program (NCP) definitions

## Using the change log inventory utility to update the BSDS

The DDF statement of the change log inventory utility can be used to insert or update information that is stored in the bootstrap data set.

### Procedure

To add or update information in the bootstrap data set:

Use the options of the DDF statement of the change log inventory utility as follows.

- To update any value, you need to use only the option for that value. To insert new values, you need values for LOCATION, LUNAME, and any other values that you want to specify.

**Value Option for inserting or updating**

**Location alias**

ALIAS *names*

This value is optional. You can add or delete aliases by respecifying the ALIAS names. The new list of names replaces the existing list.

**Location name**

LOCATION=*name*

**LU name**

LUNAME=*name*

**Generic LU name**

GENERIC=*name*

**Password**

PASSWORD=*password*

This value is optional, depending on whether you entered a password in the VTAM APPL statement

**TCP/IP connection port**

PORT=*number*

This value is optional. If you specify a value, it must be nonzero and different from the value of RESPORT. You can delete the port by entering 0.

**TCP/IP resync port**

RESPORT=*number*

This value is optional. If you specify a value, it must be nonzero and different from the value of PORT. You can delete the port by entering 0.

- To delete either a generic LU name, a password, or an alias, use one of these keywords:

**Value Statement for deleting**

**Generic LU name**

NGENERIC

**Password**

NOPASSWD

**Alias**

NOALIAS

**Related reference:**

 DSNJU003 (change log inventory) (DB2 Utilities)

## Connecting systems with TCP/IP

*Transmission Control Protocol/Internet Protocol* (TCP/IP) is a standard communication protocol for network communications. Previous versions of DB2 supported TCP/IP requesters, although additional software and configuration was required.

### About this task

The domain name (IP address) and port number (service name) uniquely identify a DB2 subsystem in the TCP/IP network. The domain name and the server port number (service name) of the database server **must** be defined in the communications database (CDB) at a requesting DB2 so that the DB2 subsystem can connect to a remote location. If you use a port number in the CDB to access a remote DB2 location, the port number must be defined to TCP/IP. The domain

name **must** be defined to the TCP/IP host so that a DB2 subsystem can accept connections from remote locations. Port numbers are never used by a DB2 subsystem that accepts connections. Optionally, you can protect the port number that DB2 uses when acting as a server within TCP/IP from being used by any other task or job in the subsystem. When DDF is started, the DB2 subsystem binds itself to its designed port.

## TCP/IP terminology

DB2 uses some terms that are specific to communications.

These terms are defined as follows.

### IP address

Uniquely identifies a host within the TCP/IP network. This is sometimes called an internet address. A DB2 subsystem resides on a TCP/IP host. The IP address can take two forms. The first form is a 32 bit address that displays in dotted decimal format where X'05041020' displays as 5.4.16.32. The second form is a 128 bit address that displays in colon-hexadecimal format, such as FEDC:BA98:7654:3210:FEDC:BA98:7654:3210.

### Domain name

The fully qualified name that identifies an IP address. This can be used instead of the IP address. An example of a domain name is *stlmvs1.stl.ibm.com*. Some software refers to *stlmvs1* as the host name and *stl.ibm.com* as the domain name. DB2 allows the network administrator to identify a host using a domain name.

### Domain name server (DNS)

Manages a distributed directory of domain names and related IP addresses. Domain names can be translated into IP addresses and you can find a domain name associated with a given IP address. DB2 uses the *gethostbyname* service to get a list of IP addresses for a given domain name.

**Port** Identifies an application executing in a host. For example, a port number identifies a DB2 subsystem to TCP/IP. A port number is a two byte integer value that is displayed in decimal format. This number identifies the application within a TCP/IP instance. A port number of X'01D2' displays as 466. There are three basic kinds of TCP/IP ports:

#### Well-known port

This is a port number between 1 and 1023 that is reserved in the TCP/IP architecture for a specific TCP/IP application. Some typical well-known port numbers are:

- FTP is port number 21
- Telnet is port number 23
- DRDA relational database is port number 446

#### Ephemeral port

Port numbers that are dynamically assigned to a client process by the client's TCP/IP instance. DB2 uses an ephemeral port when it is acting as the DRDA requester. This ephemeral port is associated with the requester for the life of the thread or connection.

#### Server port

Port numbers that are used when a TCP/IP program does not have a well-known port number, or another instance of the server program is already installed using the well-known port number. As a requester, DB2 defaults to using the DRDA relational database well-known port number to connect to a server location. We suggest that your DB2 subsystem be defined with the DRDA

well-known port number of 446. However, the network administrator can assign a server port to the DB2 subsystem. If two different DB2 subsystems reside on the same host, acting as two different locations (a non-data-sharing group), each DB2 subsystem must have a unique port. In this case, only one DB2 subsystem can use the DRDA well-known port number.

#### **Service name**

Another way to refer to a port number. A network administrator can assign a service name for a remote location instead of using the port number.

## **Enabling TCP/IP communication**

To enable TCP/IP communication between DRDA partners and DB2, you must complete some tasks such as preparing the Language Environment run time library.

### **About this task**

You do not have to complete the following steps in exact order, but steps 1, 2, and 3 should be completed before the other steps.

1. Prepare the Language Environment run time library
2. Enable DDF for UNIX System Services
3. Define the DB2 subsystem to TCP/IP
4. Populate the communications database
5. Start TCP/IP support
6. Tune TCP/IP


DB2 obtains more information from the TCP/IP stack, therefore requiring more configuration than many other daemons.

If you do not plan to communicate with remote sites with SNA/APPC, you do not need to define VTAM to DB2 if you update the BSDS DDF record with an IPNAME value. When you update the BSDS DDF record with an IPNAME value, DDF does not activate its SNA/APPC communications support. DB2 TCP/IP communications uses the IPNAME value and a character representation of the TCP/IP resync port (RESPORT) hexadecimal value to identify units of work. If the BSDS DDF record does not contain an IPNAME value, you must define VTAM to DB2 because DB2 TCP/IP communications uses the VTAM network ID and LUNAME to identify units of work.

DDF enhancements enable TCP/IP communication with DRDA partners with DRDA Level 3 support and earlier. To use the new functions, clients must have the updated versions of DB2 Connect or any DRDA requester or server that supports the latest DRDA database protocols. TCP/IP connectivity lets you connect DDF to clients on multiple platforms directly.

**Attention:** TCP/IP is the recommended communication protocol when accessing remote systems.

#### **Related concepts:**

 [TCP/IP access methods \(DB2 Data Sharing Planning and Administration\)](#)

#### **Related tasks:**

[Connecting systems with VTAM](#)

#### **Related reference:**

 DSNJU003 (change log inventory) (DB2 Utilities)

## Preparing the Language Environment run time library

Because DDF uses some functions in the Language Environment library, DDF needs access to the run time library.

### Procedure

To provide DDF with access to the run time library:

Complete one of the following options:

- Concatenate the Language Environment library in the z/OS link list, which does not require the library to be APF-authorized. This is the standard method. If you choose this method, remove the Language Environment library concatenation from the DDF JCL procedure.
- Include the Language Environment library in a STEPLIB concatenation for the DDF JCL procedure. The Language Environment library must be APF-authorized to be added to the DDF JCL procedure. The DB2 installation automatically adds the library to the DDF STEPLIB concatenation.

## Enabling DDF for UNIX System Services and TCP/IP

DDF uses the assembler callable interface of UNIX System Services to perform TCP/IP services. Any address space that needs to use UNIX System Services must have a z/OS user ID that is defined with an OMVS segment. The address space can also have a z/OS group name.

### About this task

During initialization, DDF calls UNIX System Services to obtain the maximum number of socket descriptors that can be opened concurrently. The value is defined by the MAXFILEPROC parameter in the active z/OS UNIX System Services member (BPXPRMnnn) of the z/OS PARMLIB. If the defined value is less than 131072, DDF invokes UNIX System Services to raise it to 131072, which requires the DDF user ID to have superuser authority. DDF executes as an authorized program and is protected against unauthorized use of this privilege.

The standard way to assign a z/OS user ID and a z/OS group name to a started address space is to use the z/OS Security Server (RACF) STARTED resource class. This method enables you to dynamically assign a z/OS user ID by using commands instead of requiring an IPL to have the assignment take effect. The alternative method to assign a z/OS user ID and a z/OS group name to a started address space is to change the RACF started procedures table, ICHRIN03.

### Procedure

To enable DDF to use UNIX System Services:

1. Use either of the following z/OS Security Server (RACF) commands to assign an OMVS segment to a z/OS user ID:

```
ADDUSER ddfuid OMVS(UID(nnn))...  
ALTUSER ddfuid OMVS(UID(nnn))...
```

where *ddfuid* is the z/OS user ID and *nnn* is any valid, unique identifier. If you set *nnn* to 0, the process has UNIX System Services superuser authorization.



You should either set the MAXFILEPROC parameter to at least 131072 or grant superuser authority to the DDF user ID. Because setting the MAXFILEPROC parameter within the active BPXPRM $nnn$  z/OS PARMLIB member to 131072 affects the entire system, any UNIX System Services process can open 131072 files or sockets concurrently.

2. If you do not want to set the system-wide MAXFILEPROC parameter to 131072 and do not want to grant superuser authority to the DDF user ID, you can explicitly authorize the DDF user ID to raise the limit to 131072 by using one of the following RACF commands:

```
ADDUSER ddfuid OMVS(UID(nnn) FILEPROCMAX(131072))...  
ALTUSER ddfuid OMVS(UID(nnn) FILEPROCMAX(131072))...
```

where *ddfuid* is the z/OS user ID and *nnn* is any valid, unique identifier.

3. If you also want to assign a z/OS group name to the address space, assign an OMVS segment to the z/OS group name by using one of the following RACF commands:

```
ADDGROUP ddfgnm OMVS(GID(nnn))...  
ALTGROUP ddfgnm OMVS(GID(nnn))...
```

where *ddfgnm* is the z/OS group name and *nnn* is any valid, unique identifier.

4. If you actively administer the STARTED resource class, issue the following RACF commands to assign a z/OS user ID and a z/OS group name to the DDF started procedure. DDF requires only a z/OS user ID. A z/OS group name is optional.

```
RDEFINE STARTED (VA1ADIST.*) STDATA(USER(ddfuid) GROUP(ddfgnm)) ...  
RALTER STARTED (VA1ADIST.*) STDATA(USER(ddfuid) GROUP(ddfgnm)) ...
```

where VA1ADIST.\* is the DDF started procedure, *ddfuid* is the z/OS user ID, and *ddfgnm* is the z/OS group name.

**Requirement:** The profile name that you specify in the RACF command must be in the generic format; that is, the profile name must end with a period followed by an asterisk (.\*)

5. Issue the following RACF command so that the changed profile takes effect:  
SETROPTS RACLIST(STARTED) REFRESH

6. When a member-specific dynamic VIPA (VIPARANGE DVIPA) is specified in the DB2 BSDS using the DSNJU003 keywords IPv4 or IPv6, DDF internally activates the DVIPA using the SIOCSVIPA/SIOCSVIPA6 IOCTL. However, you must either grant superuser authority to the DDF user ID or define a security profile for MODDVIPA under the SERVAUTH class to authorize the DDF user ID to execute the SIOCSVIPA/SIOCSVIPA6 IOCTL. You can define the security profile using RACF as follows:

```
RDEFINE SERVAUTH (EZB.MODDVIPA.sysname.tcpname)UACC(NONE)  
PERMIT EZB.MODDVIPA.sysname.tcpname ACCESS(READ) CLASS(SERVAUTH) ID(USER1)
```

- *sysname* is the name of the MVS system where the ID runs the MODDVIPA utility or issues the SIOCSVIPA/SIOCSVIPA6 IOCTL.
- *tcpname* is the job name of the TCP/IP started task.
- *USER1* is the DDF user ID that is being permitted to run the MODDVIPA utility (and thus the SIOCSVIPA/SIOCSVIPA6 IOCTL).

If this security profile is created, the user ID must be permitted to access this profile. Otherwise, the SIOCSVIPA/SIOCSVIPA6 IOCTL (and thus the MODDVIPA utility) fails with a “permission denied” error, regardless of superuser authority.

Also note that when using RACF, you might need to refresh these profiles before they take effect. Use the following RACF command to refresh these profiles:

```
SETROPTS RACLIST(SERVAUTH) REFRESH
```

7. DB2 for z/OS utilizes a TCP/IP DROP API through the EZBNMIFR callable service (NMI), and DB2 requires that RACF security profiles be defined to permit DB2 to successfully utilize this API. You must issue a RACF PERMIT command to enable *ssnmDIST\_userid* CONTROL access to the MVS.VARY.TCPIP.DROP command for the OPERCMDS class, where *ssnmDIST\_userid* is the user ID that is associated with the *ssnmDIST* started task.

Example (where the *ssnmDIST\_userid* is SYS0):

```
RDEFINE OPERCMDS MVS.VARY.TCPIP.DROP OWNER(SYS0) UACC(NONE)
PERMIT MVS.VARY.TCPIP.DROP CLASS(OPERCMDS) ID(SYS0) ACCESS(CONTROL)
```

Failure to provide this permission might result in a ICH408I message similar to the following:

```
ICH408I USER(ssnmDIST_userid) ...
MVS.VARY.TCPIP.DROP CL(OPERCMDS) ...
```

For additional information, see EZBNMIFR: Configuration and enablement (z/OS Communications Server: IP Programmer's Guide and Reference).

#### Related information:

[Methods for associating started procedures with RACF identities\(z/OS Security Server RACF System Programmer's Guide\)](#)

[The STARTED class \(z/OS Security Server RACF Security Administrator's Guide\)](#)

[The started procedures table \(ICHRIN03\) \(z/OS Security Server RACF System Programmer's Guide\)](#)

### DB2 configuration with TCP/IP

The DB2 subsystem uses different TCP/IP ports to do different tasks.

- As a requester, DB2 uses an ephemeral port. You do not need to specify this port.
- As a server processing TCP/IP connection requests for DRDA SQL applications, DB2 uses a server port or the well-known port, 446, which is used for relational database communications.
- A server resynchronization port is used for processing 2-phase commit resynchronization requests.

This requires some planning because the port number is used to pass the network requests to the appropriate DB2 subsystem. Each location must have a unique port number.

The figure below shows some typical z/OS system configurations.

- SYSTEM1 contains only one DB2 subsystem, so the DRDA well-known port (446) can be assigned to DB2. In the example, port number 5020 is assigned for 2-phase commit resynchronization.
- SYSTEM2 contains two DB2 subsystems, so it is impossible to assign the port numbers 446 and 5020 to both DB2 subsystems because TCP/IP can only

support one server at each port number. The problem is resolved by assigning the 446 and 5020 port numbers to DB2C, and port numbers 5021 and 5022 to DB2D.

Be sure to consider the impact of future system consolidations. If SYSTEM1 and SYSTEM2 are consolidated so that DB2A, DB2C, and DB2D run on a single z/OS system, you must take special precautions because DB2A and DB2C have the same TCP/IP port numbers. You can resolve this conflict by changing the port numbers of either DB2A or DB2C to eliminate the duplicate port numbers.

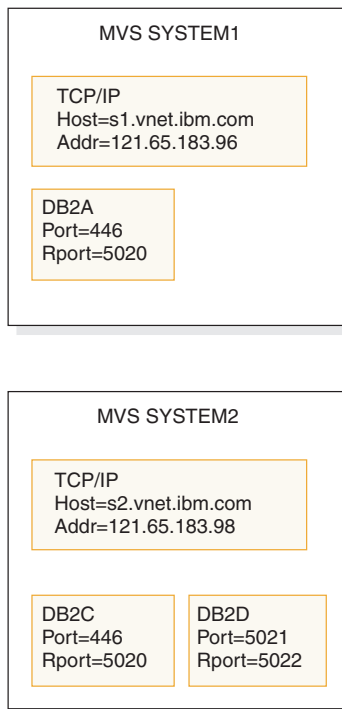


Figure 130. Typical z/OS configurations

#### Related concepts:

[🔗](#) Reserving the DRDA port (DB2 Data Sharing Planning and Administration)

#### Customizing the TCP/IP data sets or files:

To use TCP/IP, you must customize your TCP/IP data sets or files.

#### Before you begin

UNIX System Services should already be installed. See the DB2 for z/OS Program Directories for required maintenance levels.

#### Procedure

To customize your TCP/IP data sets or files:

1. Find the high level qualifier (*hlq*) value in the `resolve/tcpip.data` file that z/OS UNIX applications use in their TCP/IP stacks. This data set defines the high level qualifier, which is added to the beginning of other data set names used by TCP/IP.

- Find the *hlq.TCPPARMS*(PROFILE) data set. This data set contains the PORT statement used to make DRDA and resync port reservations. The following example shows a sample *hlq.TCPPARMS*(PROFILE) entry for SYSTEM2:

```
PORT 446 TCP DB2CDIST          ; DRDA SQL port for DB2C
PORT 5020 TCP DB2CDIST          ; Resync port for DB2C

PORT 5021 TCP DB2DDIST         ; DRDA SQL port for DB2D
PORT 5022 TCP DB2DDIST         ; Resync port for DB2D
```

This example assumes that *DB2CDIST* and *DB2DDIST* are the DB2 started procedure names.

- Define the TCP/IP host names that DB2 needs to know. The local host name **must** be defined before DDF is started. All domain names referenced in the table *SYSIBM.IPNames* **must** be defined. You define the host names by configuring the *hlq.HOSTS.LOCAL* data set, the */etc/hosts* file in the hierarchical file system (HFS), or the domain name server (DNS).

After the *hlq.HOSTS.LOCAL* data set is configured, you have to execute the utility *MAKESITE*. This utility generates the *hlq.HOSTS.ADDRINFO* and the *hlq.HOSTS.SITEINFO* data sets that are used to translate between domain names and IP addresses. *MAKESITE* generates under the userid that issued the *MAKESITE*. Therefore, those files have to be moved to the high level qualifier that represents TCP/IP. The host name for the local DB2 subsystem must be defined in at least one of these places.

You can also run the *MAKESITE* command with the *HLQ* parameter. You can set the *HLQ* parameter to the high level qualifier of the stack that you obtained in step 1. If you use the *HLQ* parameter, the *hlq.HOSTS.ADDRINFO* and the *hlq.HOSTS.SITEINFO* data sets are created and updated under the correct high level qualifier, so you do not have to move the data sets from under the userid high level qualifier to the TCP/IP high level qualifier.

If domain names are present in the CDB (in field *IPADDR* of table *SYSIBM.IPNames*), they must be defined in the z/OS data sets, the HFS or the DNS.

**Recommendation:** To support a Parallel Sysplex environment, use Dynamic Virtual IP Addresses (VIPA). To configure a DB2 subsystem to perform Dynamic VIPA routing, specify the DB2 group Dynamic VIPA on the TCP/IP PORT statement for the DRDA PORT number. This Dynamic VIPA must be the same for all DB2 members in the data sharing group. All clients must use the Dynamic VIPA to route requests to the DB2 group. To DB2 member-specific Dynamic VIPA is specified on the TCP/IP RESYNC PORT number in the TCP/IP profile data set for each DB2 member of the sysplex.

The following example shows a sample *hlq.TCPPARMS*(PROFILE) entry for SYSTEM2:

```
PORT 446 TCP DB2DIST BIND db2_sysplex_VIPA          ;DRDA SQL port for DB2
PORT 5001 TCP DB2DIST BIND member_specific_VIPA      ;RESYNC port for DB2
```

- Define the TCP/IP service names that DB2 needs to know. Configure the *hlq.ETC.SERVICES* data set or the */etc/services* file in the HFS. If service names are present in the CDB (in field *PORT* of table *SYSIBM.LOCATIONS*), they must be defined in the z/OS data set or the HFS.

The following example shows a sample *hlq.ETC.SERVICES* entry:


```
DRDA          446/tcp          ; DRDA databases
```

**Related concepts:**


DB2 configuration with TCP/IP

 DVIPA network addressing (DB2 Data Sharing Planning and Administration)

**Related tasks:**

 Configuring the base TCP/IP system

**Related information:**

 Configuration files for the TCP/IP stack (z/OS Communications Server: IP Configuration Guide)

**Modifying the change log inventory job for using TCP/IP:**

If you want to use TCP/IP, the DDF statement of the change log inventory job (DSNJU003) must specify values for the parameters PORT and RESPORT.

**Procedure**

To modify the change log inventory job for using TCP/IP:

Specify the PORT and RESPORT parameters in the DDF statement of DSNJU003. The parameter PORT is the TCP/IP port number that DDF uses to accept incoming DRDA connection requests. The parameter RESPORT is the TCP/IP port number that DDF uses to accept incoming DRDA 2-phase commit resynchronization requests. The values for these parameters must be decimal numbers between 0 and 65534, where 0 indicates that TCP/IP support is being deactivated. The non-zero value for PORT must not be the same as the non-zero value for RESPORT.

For data sharing, all members of the DB2 data sharing group must have the same value for PORT. RESPORT must be uniquely assigned to each DB2 member so that no two DB2 members use the same TCP/IP port for 2-phase commit resynchronization. The parameters PORT and RESPORT can be changed on any DB2 member by running the utility change log inventory. After running the utility, you must stop and then restart DB2. Because PORT is the same for all members of the DB2 group, this process has to be repeated on every member of the group when PORT is changed.

If you use Dynamic VIPA to support a Parallel Sysplex environment, specify the the DB2 group Dynamic VIPA on the TCP/IP PORT statement for the DRDA PORT number.


You can define an alias location for all or selected members of a data sharing group by using the ALIAS parameter.

Remember, a zero value for either PORT or RESPORT is the same as deactivating TCP/IP support in DB2.


You can also specify an IPv4 address and an IPv6 address for the subsystem in the DDF statement of the change log inventory utility (DSNJU003). Specifying an IPv4 and an IPv6 address keeps the subsystem IP addresses constant, regardless of the z/OS system where the subsystem is started. The IP address moves with the DB2 subsystem. In data sharing environments, a constant IPv4 address and a constant IPv6 address can be assigned to represent the entire group.

**Related concepts:**

 DVIPA network addressing (DB2 Data Sharing Planning and Administration)

 Update the BSDS with the DSNJU003 utility (DB2 Data Sharing Planning and Administration)

**Related tasks:**

 Configuring subsets for member-specific access (DB2 Data Sharing Planning and Administration)

**Related reference:**

 Syntax and options of the DSNJU003 control statement (DB2 Utilities)

## Populating the communications database for use with TCP/IP

If you plan to use DB2 only as a server, you do not need to populate the CDB.

### About this task

#### GUPI

For example, Spiffy's USIBMSTODB21 subsystem works as a server for many requesters. It is not necessary for Spiffy to register those requesters in the DB2 CDB.

However, if you intend to request data, you need to enter port numbers or service names in field PORT of table SYSIBM.LOCATIONS, and IP addresses or domain names in field IPADDR of table SYSIBM.IPNAMES. The LINKNAME in table SYSIBM.LOCATIONS is used to search tables SYSIBM.IPNAMES and SYSIBM.LUNAMES.

Updates to the following tables take place whenever a new remote connection is requested, without any need to stop and restart DDF:

- SYSIBM.LOCATIONS
- SYSIBM.IPNAMES
- SYSIBM.IPLIST


If you use RACF PassTickets, the LINKNAME must match the following values at the remote site:

- LUNAME  
If the remote site is a DB2 subsystem that is defined with only an LUNAME value and no GENERIC LU name value or IPNAME value.
- GENERIC  
If the remote site is a DB2 subsystem that is defined with a GENERIC LU name value in addition to an LUNAME value, but no IPNAME value.
- IPNAME  
If the remote site is a DB2 subsystem that is defined with an IPNAME value, which triggers the DDF on the remote DB2 subsystem to activate TCP/IP communications support only.

After you populate these tables, you can write queries that access data at a remote system.

#### GUPI


#### Related concepts:

 Support for executing long SQL statements in a distributed environment (DB2 Application programming and SQL)

#### Related tasks:

 Granting privileges to remote users (Managing Security)

#### Related reference:

 SYSIBM.USERNAMES columns (Managing Security)

## TCP/IP-relevant columns of the SYSIBM.LOCATIONS table:

The LOCATIONS table contains the port number or service name that is used to connect to remote locations. The LINKNAME column of the LOCATIONS table corresponds to a row in the IPNAMES table.

### GUIP

The LOCATIONS table has the following columns that relate to TCP/IP:

#### DBALIAS VARCHAR(128) NOT NULL

The name that is associated with the server. This name is used to access a remote database server. If DBALIAS is blank, the location name is used to access the remote database server. This column does not change database object names that are sent to the remote by using a location qualifier. Use the DBALIAS column to access data at two or more different remote locations when those remote locations have the same name.

#### LOCATION CHAR(16)

The unique network location name, or DRDA RDBNAM, that is assigned to a remote or local system. You must provide location names for any systems from which you request data. This column is the primary key for this table.

#### LINKNAME CHAR(8)

Identifies the TCP/IP attributes that are associated with this location. For each specified LINKNAME, you must have a row in SYSIBM.IPNAMES whose LINKNAME matches the value that is specified in this column. Because this table is used for outbound requests, you must provide a LINKNAME or your requests fail. Do not enter blanks in this column.

#### PORT CHAR(32)

If blank, the default port, 446, is used for TCP/IP communications. Otherwise, the value can be either of the following values:

- The port number of the remote database server. The number must be one to five characters and left-justified.
- A TCP/IP service name. The service name is converted to a TCP/IP port number with the *getserbyname* socket call.

Spiffy's USIBMSTODB21 location expects a LOCATIONS table that looks like the table below. The location USIBMSTODB21 uses the default DRDA PORT, 446.

Table 168. Spiffy's LOCATIONS table

LOCATION	LINKNAME	PORT
USIBMSTODB21	LUDB21	
USIBMSTODB22	LUDB22	
USIBMSTOSQL1	LUSQLDS	1234
USIBMSTOSQL2	LUSQLDS	DRDA

For example, add the second row with this statement:

```
INSERT INTO SYSIBM.LOCATIONS (LOCATION, LINKNAME)
VALUES ('USIBMSTODB22', 'LUDB22');
```

Because no port number is specified, location USIBMSTODB22 uses the default DRDA port number 446.

**A row for the local location:** You do not need a row for the local DB2 in the IPNAMES and LOCATIONS tables. For example, Spiffy's USIBMSTODB21 subsystem does not require a row that shows its own LINKNAME and location name.

#### GUPI

#### TCP/IP-relevant columns of the SYSIBM.IPLIST table:

The IPLIST table contains a list of multiple IP addresses that are specified for a given location.

#### GUPI

IPLIST has the following columns:

##### LINKNAME CHAR(8) NOT NULL

This column is associated with the value of the LINKNAME column in SYSIBM.LOCATIONS and SYSIBM.IPNAMES. The values of the other columns in the SYSIBM.IPNAMES row apply to the server that is identified by the LINKNAME column in this row.

##### IPADDR VARCHAR(256) NOT NULL

This column contains an IPv4 or IPv6 address or domain name of a remote TCP/IP host of the server. If using WLM domain name server workload balancing, this column must contain the member-specific domain name. If you use dynamic VIPA workload balancing, this column must contain the member-specific dynamic VIPA address.

- An IPv4 address must be left justified and is represented as a dotted-decimal address. An example of an IPv4 address is *9.112.46.111*.
- An IPv6 address must be left justified and is represented as a colon-hexadecimal address. An example of an IPv6 address is *2001:0DB8:0000:0000:0008:0800:200C:417A*, which can also be expressed in compressed form as *2001:DB8::8:800:200C:417A*.
- A domain name is converted to an IP address by the domain name server where a resulting IPv4 or IPv6 address is determined. An example of a domain name is *stlmos1.svl.ibm.com*. The *gethostbyname* socket call is used to resolve the domain name.

##### IBMREQD CHAR(1) NOT NULL WITH DEFAULT 'N'

This column indicates whether the row came from the basic machine-readable material (MRM) tape: N=no, Y=yes

#### GUPI

#### TCP/IP-relevant columns of the SYSIBM.IPNAMES table:

The IPNAMES table defines the outbound security and host names that are used to connect to other systems through TCP/IP.



## GUIP

IPNAMES has the following columns:

### LINKNAME CHAR(8)

This value matches that specified in the LINKNAME column of the associated row in SYSIBM.LOCATIONS.

### SECURITY\_OUT CHAR(1)

Defines the security option that is used when local DB2 SQL applications connect to any remote server associated with this TCP/IP host. The default, A, means that outgoing connection requests contain an authorization ID without a password.

### USERNAMES CHAR(1)

This column is used for outbound requests to control translations of authorization IDs. The values 'O' or 'B' are valid for TCP/IP connections.

### IPADDR VARCHAR(254)

This column contains an IPv4 or IPv6 address or domain name of a remote TCP/IP host.

- An IPv4 address must be left justified and is represented as a dotted-decimal address. An example of an IPv4 address is *9.112.46.111*.
- An IPv6 address must be left justified and is represented as a colon-hexadecimal address. An example of an IPv6 address is *2001:0DB8:0000:0000:0008:0800:200C:417A*, which can also be expressed in compressed form as *2001:DB8::8:800:200C:417A*.
- A domain name is converted to an IP address by the domain name server where a resulting IPv4 or IPv6 address is determined. An example of a domain name is *stlmos1.sol.ibm.com*. The *gethostbyname* socket call is used to resolve the domain name.

## GUIP

### TCP/IP-relevant columns of the SYSIBM.USERNAMES table:

The USERNAMES table contains information that is needed for outbound translation only.

## GUIP

**Remember:** Inbound ID translation and *come from* checking are not done for TCP/IP requesters.

The USERNAMES table has the following columns:

### TYPE CHAR(1)

Whether the row is for outbound translation. The value 'O' is valid for TCP/IP connections.

### AUTHID CHAR(8)

Authorization ID to translate. If blank, it applies to all authorization IDs.

### LINKNAME CHAR(8)

Identifies the TCP/IP network location associated with the row. A blank

indicates it applies to all TCP/IP partners. For nonblank values, this value must match the LINKNAME value in SYSIBM.IPNAMES.

#### NEWAUTHID CHAR(8)

The translated value of AUTHID.

#### PASSWORD CHAR(8)

The password to accompany an outbound request. This column is ignored if RACF PassTickets, or already verified USERIDs are used.



### Starting TCP/IP support

Before you start DDF, ensure that z/OS UNIX System Services and TCP/IP are started. Also ensure that the local host information is set up correctly in the TCP/IP configuration files.

#### About this task

**Important:** When using dynamic VIPA, the IP addresses that have been assigned to DB2 by the TCP/IP profile must be registered with the DNS.

#### Procedure

To start TCP/IP support:

Start DDF.

DDF executes the following steps when it is started:

1. Establishes the TCP/IP listener by opening sockets for the DRDA SQL, Secure SQL, and resync ports to accept connections from remote locations.
2. Obtains the host name that is specified in TCPIP.DATA. The host name is used to register with WLM and, in some cases, to obtain the IP address. You can specify the IP address that DB2 should use for communication with its partners as follows:
  - Note that DB2 10 is an IPv6 system and does not use gethostid to obtain the IP addresses because gethostid does not support IPv6. You can instead specify the address in the domain name server (DNS), if one is present, or in a local host file. You can specify an IPv4 address, an IPv6 address, or both, which should be mapped to the host name that is specified in TCPIP.DATA. DB2 obtains the user-specified IP addresses by resolving the host name.
  - If you want DDF to accept connections only on a specific IP address (IPv4 or IPv6), specify the IP address on the SQL port in the TCP/IP profile by using the BIND keyword. For example, use the following configuration, where 446 is the SQL port and *Vx* is either an IPv4 or IPv6 address:

```
PORT
446 TCP DB2ADIST BIND Vx
```

With this method, DB2 only accepts connections on the specified IP address. Moreover, this method is not supported with secure SQL port. If your subsystem is running in data sharing mode, you must also specify an IP address on the DRDA resync port. For more details, see TCP/IP access methods (DB2 Data Sharing Planning and Administration).

- The most recommended place to specify the IP address is in the DDF communication record of the bootstrap data set (BSDS) by using the DSNJU003 utility. For example:

```
//SAMPLE EXEC PGM=DSNJU003
//SYSIN DD *
DDF IPV4=1.2.3.4,
IPV6=1::2
```

The advantage of this approach is that DB2 accepts connections not only on the specified IP address, but on any IP address that is active on the TCP/IP stack. Additionally, connections are accepted on both secure and non-secure SQL ports. DB2 also resolves the host name to an IP address through a name server or local host file to fill up any IP address that is not specified in the BSDS. For example, if the BSDS specified IPv4 but not IPv6, DB2 would try to obtain the IPv6 address by resolving the host name.

**Important:** IP addresses should not be specified simultaneously in both the DB2 BSDS and TCP/IP PORT statement. Binding to a specific IP address and binding to any IP address (INADDR\_ANY) are mutually exclusive, and DDF TCP/IP services will not be available until the IP addresses are specified in only one place.

3. Obtains the domain name by resolving the IPv6 address, if one is specified, or the IPv4 address through a name server or the local host file. If you use data sharing, member domain names are obtained by resolving member IP addresses, and group domain names are obtained by resolving group IP addresses.

**Important:** Whether you use data sharing or not, DB2 10 uses the domain name that you specify in the name server, if one is present, or in a local host file, without further modifying or qualifying the name. However, DDF tolerates the absence of a domain name, when the IP address is specified in the DB2 BSDS.


To determine the host IP address and domain name, issue a DISPLAY DDF command. The IPADDR field of the DSNL085I message displays the IPv4 and IPv6 addresses, if any, that are associated with the host.

```
DSNL081I STATUS=STARTD
DSNL082I LOCATION          LUNAME          GENERICLU
DSNL083I STLEC1           USIBMSY.SYEC1DB2  -NONE
DSNL084I TCPPORT=446     SECPOR=0       RESPOR=5001
DSNL085I IPADDR=:9.30.113.198
DSNL085I IPADDR=2001:DB8::8:800:200C:417A
DSNL099I DSNLTDDF DISPLAY DDF REPORT COMPLETE
```

Until the local host information is available, DDF TCP/IP services are not available to local and remote applications. If a failure occurs obtaining the local host information, DDF periodically attempts to get the local host information until successful or until DDF is stopped. DDF tolerates the absence of a domain name as long as an IP address is specified in the DB2 BSDS.

4. Listens and accepts connection requests on SQL, secure SQL, and resync ports.

**Related concepts:**

 Communicating with data sharing groups (DB2 Data Sharing Planning and Administration)

 DVIPA network addressing (DB2 Data Sharing Planning and Administration)

## Tuning TCP/IP

Tuning TCP/IP is optional, but it can protect DB2 from TCP/IP outages.

### Procedure

To tune TCP/IP:

Specify a small value, five minutes or less, for the TCP/IP KeepAlive timer. You can specify the value for the TCP/IP KeepAlive timer either in the TCP/IP KEEPALIVE field of the Distributed data facility panel 2: DSNTIP5 or in the TCPKPALV parameter. If the network fails between the server's reply and the next client request, TCP/IP waits until the KeepAlive timer expires, then notifies the DB2 subsystem of the failure.

The server thread hangs while the timer is running. Do not use the timer default of ENABLE because it results in a value of 2 hours, which means that threads can hang for up to 2 hours. A hanging thread can cause unpredictable results, depending on what resources it has locked.

If you are connecting to a location whose LINKNAME is associated with a row in the table SYSIBM.IPNAMES and it has a domain name in the IPADDR field, *gethostbyname* can return a list of IP addresses associated with the LINKNAME. When trying to connect to this location, DB2 will try each of these IP addresses in a round-robin fashion (starting with the first address) until the connection is successful, or the attempt to connect to each IP address has timed out.

## TCP/IP limitations

TCP/IP does not have the built-in security features that SNA has, such as SNA partner LU verification.

Because IP addresses are not as reliable as LU names, DDF support for TCP/IP differs from support for SNA in these ways:

- There is no support for inbound name translation.
- A DB2 subsystem parameter defines the minimum security requirements for all TCP/IP clients because inbound security requirements cannot be established on individual clients. See the description of the TCP/IP ALREADY VERIFIED field on installation panel DSNTIP5.
- You cannot use the CDB for *come from* checking of TCP/IP clients.

**Related reference:**

DSNTIP5: Distributed data facility panel 2

## Initializing a TCP stack for use with a VIPA

During initialization of a TCP stack for use with a virtual IP address (VIPA), the PROFILE.TCPIP configuration should contain the HOME list with the VIPA. The HOME list should be followed by the PRIMARYINTERFACE statement pointing at the appropriate VIPA that is to be used by DB2.

### About this task

**Recommendation:** Do not change the stack's HOME list or the PRIMARYINTERFACE while DDF is started.

### Procedure

To initialize a TCP stack for use with a VIPA:

Use the VARY OBEY command to change the PRIMARYINTERFACE and the stack's HOME list. This command can be used while the stack is running without recycling the stack. If a new HOME list is specified with the VARY OBEY file, the PRIMARYINTERFACE should also be specified.

## Initializing a TCP stack for use with both IPv4 and IPv6 addresses

To use both IPv4 and IPv6 addresses, DB2 requires TCP/IP dual-mode stack support. Dual-mode stack support allows IPv4 address communication with IPv4 partners, and IPv6 address communication with IPv6 partners.

### About this task

If you need only IPv4 address communication, an IPv4-only stack environment is sufficient because DB2 detects if the stack supports IPv6, and if not, DB2 allows communication with IPv4 addresses only.

### Procedure

To enable TCP/IP for IPv4/IPv6 dual-mode stack:

1. Modify the BPXPRMxx member to define two NETWORK statements, one for AF\_INET, and another for AF\_INET6.

The following example shows two NETWORK statements in the BPXPRMxx member:

```
FILESYSTYPE TYPE(INET) ENTRYPPOINT(EZBPFINI)
NETWORK DOMAINNAME(AF_INET)
        DOMAINNUMBER(2)
        MAXSOCKETS(12000)
        TYPE(INET)
NETWORK DOMAINNAME(AF_INET6)
        DOMAINNUMBER(19)
        MAXSOCKETS(13000)
        TYPE(INET)
SUBFILESYSTYPE NAME(TCPIP) ENTRYPPOINT(EZBPFINI)
        TYPE(INET)
```

Separate MAXSOCKETS values are supported. The IPv6 default will be the IPv4 specified value.


2. To verify that TCP/IP is configured to support a dual-mode environment, enter a `d tcpip,,netstat,home` command on the z/OS console. Look for the INTFNAME field that has a value of LOOPBACK6 and verify that the associated ADDRESS field has a compressed colon-hexadecimal IPv6 address of `::1`.

The following example shows that TCP/IP is configured to support both IPv4 and IPv6:

```
d tcpip,,netstat,home
EZD0101I NETSTAT CS V1R5 TCPIP 034
HOME ADDRESS LIST:
LINKNAME: CTC1LINK
  ADDRESS: 9.30.115.135
  FLAGS: PRIMARY
LINKNAME: LOOPBACK
  ADDRESS: 127.0.0.1
  FLAGS:
INTFNAME: LOOPBACK6
```

```
ADDRESS: ::1
TYPE: LOOPBACK
FLAGS:
3 OF 3 RECORDS DISPLAYED
```

#### Related reference:

 [z/OS Communications Server: IPv6 Network and Application Design Guide](#)

## Two-phase commit for TCP/IP clients

DB2 supports two types of two-phase commit for TCP/IP clients.

- The DRDA client coordinates the two-phase commit. If a failure occurs during the commit process, DB2 might need to resynchronize with the DRDA client.
- The DRDA client gives responsibility for the resynchronization to DB2. The client sends DB2 a list of server LOCATION names, domain names, and resync IP addresses that are part of the client's unit of work. DB2 Connect uses this support by allowing DB2 to act as its Transaction Manager Database (TM\_DATABASE), thereby eliminating the need to have a local database to manage the two-phase commit process. If a failure occurs during the two-phase commit process, DB2 might need to resynchronize with one or more of the server locations sent by the client.

DB2 uses the port specified on the RESYNC PORT field of installation panel DSNTIP5 for two-phase commit resynchronization. DB2 begins resynchronization using the partner's IP address and LOCATION name, and the RESYNC PORT obtained at the time of initial connection. If the partner's IP address changed, the resynchronization fails. For example, if the partner was DB2 for z/OS, the IP address can change when the automatic restart manager (ARM) restarts a data sharing member on a different CPC. The IP address can also change when an z/OS adapter fails and virtual IP addresses were not used.

If the IP address fails, DB2 uses the partner's domain name to determine the IP address for resynchronization. DRDA requesters receive the port number and domain name to be used for two-phase commit resynchronization from the server during DRDA connect processing.

No CDB definition is required to do resynchronization.

## Multiple TCP/IP stacks and DB2

Running multiple TCP/IP stacks does not provide performance advantages over a single TCP/IP stack, which can provide high levels of scalability and performance by itself. Running multiple stacks requires more private and ECSA memory consumption and some additional processor consumption. It is also a much more complicated environment to manage from an administrative perspective.

Although multiple TCP/IP stacks are not recommended for DB2, multiple stacks might be appropriate for your installation. A possible scenario for using multiple TCP/IP stacks could be where a single DB2 system must connect to multiple networks that have distinct security characteristics (for example, intranet and internet) and strict separation is required. The firewall on the external stack can be configured to forward only selected traffic internally, while the internal stack does what is indicated with internal traffic, including forwarding to the external stack. Second, a denial-of-service attack on the stack that handles external traffic would not affect the stack that handles internal traffic, so two stacks offer an element of resistance to attack.

## Multiple DB2 subsystems with multiple TCP/IP stacks

z/OS UNIX System Services provides a way to configure DB2 to use a single transport stack.


This allows each DB2 subsystem to be restricted to a single stack. Each would be reachable by any IP address that is owned by the selected stack, but not by other IP addresses. Adding BPXTCAFF as a new job step before the existing EXEC card for DSNYASCP for the *ssnmDIST* procedure allows DB2 to bind to a single stack when there are at least two stacks running on a single z/OS image. When you add the BPXTCAFF step as the first step, you must specify either TIME=1440 or TIME=NOLIMIT to the EXEC DSNYASCP card because the SYST parameter is disabled when a second job step is added to the *ssnmDIST* procedure.

## Multiple DB2 subsystems with one TCP/IP stack

The TCP Server Bind Control allows multiple DB2 subsystems to use the same port number within the same z/OS image.

This allows multiple DB2 subsystems that bind to any IP address (also known as INADDR\_ANY in sockets API terms) and the same port number on the same stack to be bound to separate IP addresses. For example, consider two DB2 subsystems in a data sharing group where both have the same LOCATION and same DRDA PORT. A new 'BIND ipaddr' parameter is added to the PORT statement. When DB2 (identified by job name *ssnmDIST*) issues a bind to the port number in the PORT statement and to INADDR\_ANY, the bind is restricted to the IP address specified on the PORT statement for that DB2 subsystem. This allows two DB2 subsystems to share the same stack by limiting them to different single IP addresses (virtual IP addresses are recommended). This allows them to be reached by any physical connectivity that can get to the stack.


### Related reference:

 [PORT statement \(z/OS Communications Server: IP Configuration Reference\)](#)

## Specifying security requirements

When you set up systems to communicate through TCP/IP, you must specify security requirements.

### Related tasks:

 [Establishing RACF protection for DB2 \(Managing Security\)](#)

---

## Configuring the DB2 command line processor

You can use the DB2 command line processor to issue SQL statements, bind DBRMs that are stored in HFS files, and call stored procedures. To use the command line processor, ensure that your system meets the command line processor prerequisites. Then, set up your system to use the command line processor.

### Related concepts:

 [Command line processor \(DB2 Commands\)](#)

## Command line processor prerequisites

Before you can set up your system to use the DB2 command line processor, the system must meet several prerequisites.

Ensure that your system has the following features:

- Java 1.4.2 service release 2.  
If you use or reference the DB2 10 DECIMAL FLOAT SQL type, Java 1.5 is required.
- IBM Data Server Driver for JDBC and SQLJ.  
For information on installing this feature, see *Installing the IBM Data Server Driver for JDBC and SQLJ on DB2 for z/OS (DB2 Application Programming for Java)*.
- DB2 metadata stored procedures installed and authorized.  
To install and authorize the DB2 metadata stored procedures, run the installation job DSNTIJRT. To check if the DB2 metadata stored procedures were successfully installed and activated, run the validation job DSNTIJRV.

## Setting up your system to use the DB2 command line processor

The command line processor on DB2 for z/OS is a Java application that runs under UNIX System Services.

### Before you begin

Before you begin setting up the DB2 command line processor, ensure that your system meets the command line processor prerequisites.

### Procedure

To set up your system to use the DB2 command line processor:

1. Modify the CLASSPATH variable in your .profile file to include the clp.jar file.  
If you install the command line processor into the /usr/lpp/db2a10\_base directory, you can issue the following command to modify your CLASSPATH variable:

```
export CLASSPATH=$CLASSPATH:/usr/lpp/db2a10_base/lib/clp.jar
```

2. Optional: Define the CLPPROPERTIESFILE environment variable in your .profile file to include the full path name where the properties file is located.  
You can create your own properties file with any name. A sample properties file is in the directory where the command line processor is installed. If you install the command line processor into the /usr/lpp/db2a10\_base directory, you can issue the following command to define the CLPPROPERTIESFILE environment variable in your .profile file:

```
export CLPPROPERTIESFILE=/usr/lpp/db2a10_base/samples/clp.properties
```

If the CLPPROPERTIESFILE environment variable is undefined, the command line processor uses default values for all options when it is invoked.

3. Optional: Define an alias for starting the command line processor in your .profile file:

For example:

```
alias db2="java com.ibm.db2.clp.db2"
```

### Results

Additional instructions for setting up the DB2 command line processor are available in the DB2 command line processor readme file. By default, the DB2 command line processor readme file (README\_CLP) is installed into the /usr/lpp/db2a10\_base directory.



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## IBM Text Search for DB2 for z/OS

IBM Text Search for DB2 for z/OS provides full-text search capability for text columns that are stored in DB2.

**Related information:**

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### Creating database objects that support query acceleration

If you use an accelerator, you must create a database, a table space, tables, and indexes for the accelerator to use.

#### Procedure

To create database objects for use by an accelerator:

1. Configure and run sample job DSNTIJAS in the SDSNSAMP library to create the objects that are required for an accelerator.

After the SYSACCEL.SYSACCELERATORS and SYSACCEL.SYSACCELERATEDTABLES tables are created, they are populated by the accelerator with a server definition and the associated IP address.


After the SYSACCEL.SYSACCELERATEDPACKAGES table and its indexes are created, they are populated by DB2 during a bind operation that specifies the QUERYACCELERATION bind option. They are not used by the accelerator.

2. Restrict access to the SYSACCEL.SYSACCELERATORS, SYSACCEL.SYSACCELERATEDTABLES, and SYSACCEL.SYSACCELERATEDPACKAGES tables that are created by job DSNTIJAS. The SYSACCEL.SYSACCELERATORS and SYSACCEL.SYSACCELERATEDTABLES tables are used by DB2 to control the acceleration behavior of the accelerator servers that are defined for the DB2 subsystem. The SYSACCELERATEDPACKAGES table is used by DB2 to control the acceleration behavior of static SQL queries in a DB2 package.

**Related tasks:**

 [Enabling DB2 for IBM DB2 Analytics Accelerator for z/OS \(DB2 Performance\)](#)

**Related reference:**

 [Support Portal: IBM DB2 Analytics Accelerator for z/OS](#)

 [Tables that support query acceleration \(DB2 SQL\)](#)



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## Chapter 11. Working with international data

DB2 handles different character sets in distributed data through character conversions.

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### Character conversion concepts

Character data that is transmitted from one DBMS to another might need to be converted to a different coded character set.

In different database management systems (DBMSs), character data can be represented by different encoding schemes. Within an encoding scheme, there are multiple coded character set identifiers (CCSIDs). EBCDIC, ASCII, and Unicode are ways of encoding character data.

The Unicode character encoding standard is a character encoding scheme that includes characters from almost all living languages of the world. DB2 supports two implementations of the Unicode encoding scheme: UTF-8 (a mixed-byte form) and UTF-16 (a double-byte form).

All character data has a CCSID. Character conversion is described in terms of CCSIDs of the source and of the target. When you install DB2, you must specify a CCSID for DB2 character data in either of the following situations:

- You specify AUTO or COMMAND for the DDF STARTUP OPTION field on panel DSNTIPR.
- Your system will have any ASCII data, Unicode data, EBCDIC mixed character data, or EBCDIC graphic data. In this case, you must specify YES in the MIXED DATA field of panel DSNTIPF, and the CCSID that you specify is the mixed data CCSID for the encoding scheme.

The CCSID that you specify depends on the national language that you use.

DB2 performs most character conversion automatically, based on system CCSIDs, when data is sent to DB2 or when data is stored in DB2. If character conversion must occur, DB2 uses the following methods:

1. DB2 searches the catalog table SYSIBM.SYSSTRINGS.
2. DB2 uses z/OS Unicode Conversion Services.

If DB2 or z/OS Unicode Conversion Services does not provide a conversion for a certain combination of source and target CCSIDs, you receive an error message. If the conversion is incorrect, you might get an error message or unexpected output. To correct the problem, you need to understand the rules for assigning source and target CCSIDs in SQL operations.

#### **Related concepts:**

System-coded character set identifiers

Unicode support in DB2

 [Coded character sets and CCSIDs \(Introduction to DB2 for z/OS\)](#)

#### **Related reference:**

 [Character conversion \(z/OS: Unicode Services User's Guide and Reference\)](#)

---

## System-coded character set identifiers

To support character conversion, the IBM Distributed Relational Database Architecture (DRDA) uses CCSIDs to label the various character representation schemes.

The CCSID is a two-byte binary number that uniquely identifies one or more pairs of character sets and code pages. The coded character set defines how bit configurations are mapped for character data.

The CCSID of character strings at your site is determined by the CCSID that you specify on installation panel DSNTIPF.

The correct CCSID is the number that identifies the coded character set that is supported by your I/O device.

**Attention:** If this CCSID is not correct, character conversion produces incorrect results.

es, local applications such as IMS and QMF, and remote applications such as CICS Transaction Server.

**Related reference:**

DSNTIPF: Application programming defaults panel 1

**Related information:**

 [Character Data Representation Architecture Reference](#)

## Unicode support in DB2

*Unicode* is a universal encoding scheme for written characters and text that enables the exchange of data internationally. Unicode provides a character set standard that can be used all over the world.

Unicode uses an encoding scheme that provides code points for approximately 100 000 characters. An extension called UTF-16 allows for encoding as many as a million more characters. Unicode provides the ability to encode all characters used for the written languages of the world. Unicode treats alphabetic characters, ideographic characters, and symbols equivalently because it specifies a numeric value and a name for each of its characters. Unicode includes punctuation marks, mathematical symbols, technical symbols, geometric shapes, and dingbats.

DB2 provides the following Unicode encoding forms:

- UTF-8: Unicode Transformation Format, 8-bit encoding form that is designed for ease of use with existing ASCII-based systems.
- UTF-16: Unicode Transformation Format, 16-bit encoding form that is designed to provide code values for over a million characters and a superset of UCS-2. UCS-2 is a universal character set and is coded in 2 octets, which means that characters are represented in 16 bits per character.

**Unicode CCSIDs:** The Unicode CCSID field of panel DSNTIPF is pre-filled with 1208. DB2 chooses the CCSIDs for double-byte and single-byte values (1200 for DBCS and 367 for SBCS). CCSID 1200 corresponds to UTF-16 and CCSID 367 is for 7-bit ASCII.

## Customizing support for Unicode

You must customize z/OS Unicode support to use Unicode data in DB2.

## Before you begin

Ensure that the conversion environment is active. The steps for this process can be found in *z/OS Support for Unicode: Using Unicode Services*. DB2 can use the conversion services of z/OS support for Unicode only when the conversion environment is active. The infrastructure provides tools to create a conversion image. When the image is loaded into a common data space, the conversion environment is activated, and the conversion services are ready to be used by DB2.

## Procedure

To customize support for Unicode:

1. Customize the job card. The jobs in *hlq.SCUNJCL*, as shipped by IBM, have placeholders for values on the JOB statement, such as in the following example:

```
//$JOBPREF$$JOBNAME$ JOB ($ACCOUNT$), '$USER$',  
//    NOTIFY=$NOTIFY$,MSGCLASS=$MC$,MSGLEVEL=$ML$,  
//    TIME=$TI$,CLASS=$CL$,REGION=$REGIONØM$
```

Use the REXX EXEC CUNRUCST in *hlq.SCUNREXX* to customize these values. When you run the REXX EXEC CUNRUALL, the values that you specify are supplied on all of the JCL images. You can choose to customize your system by displaying Japanese messages or displaying English messages with modified date and time formats. You can set up the z/OS Message Service to specify how you want messages to be displayed.

2. Set up the conversion image. The following example is the sample JCL member in *hlq.SCUNJCL* (CUNJIUTL):

```
//CUNMIUTL EXEC PGM=CUNMIUTL  
//SYSPRINT DD SYSOUT=*  
//TABIN DD DISP=SHR.DSN=hlq.SCUNTBLL  
//SYSIMG DD DSN=hlq.IMAGES(CUNIMGØØ),DISP=SHR  
//SYSIN DD *  
/*****  
* INPUT STATEMENTS FOR THE IMAGE GENERATOR *  
*****/  
CASE NORMAL; /* ENABLE TOUPPER AND TOWER */  
CONVERSION 1047,850; /* EBCDIC -> ASCII */  
CONVERSION 850,1047; /* ASCII -> EBCDIC */  
/*
```

In the preceding example, the two CONVERSION statements provide conversion between the EBCDIC code page 1047 and the ASCII code page 850 in both directions. The DD names that are passed to CUNMIUTL are described as follows:

### **SYSPRINT**

A listing that shows the processed setups and error messages, if applicable.

### **TABIN**

Conversion tables for character conversion and case conversion. They are supplied by IBM; in this example, they are in data set *hlq.SCUNTBLL*. The image transforms the conversion tables into an internal format and stores them in the conversion image.

### **SYSIMG**

Output is a single image of the entire conversion environment. The conversion image is built according to the specification in the SYSIN DD name. The conversion image resides in either a sequential data set

or a member of a partitioned data set with a fixed-block 80-byte format. In this example, the image resides in the partitioned data set member *hlq.IMAGES(CUNIMG00)*.

## **SYSIN**

Two types of statements are recognized in this DD statement: case conversion, which is identified by the CASE control statement, and character conversion, which is identified by the CONVERSION control statement.

### **CASE control statement:**

Case conversion is defined as converting Unicode characters (for example, UTF-8) to their uppercase equivalent or their lowercase equivalent. In the preceding example, CASE NORMAL is specified, which means basic case conversion is provided. This basic case conversion is based on the UnicodeData.txt file that is provided by the Unicode consortium. It does not include special casing as described in the SpecialCasing.txt file that is provided by the Unicode consortium. Special casing typically includes characters that have significant differences in the case-based appearance. For example, the German "hard S", which appears as a flat B, appears as "SS" in uppercase German text. Because DB2 does not use the case conversion service, you do not need to specify a conversion.

### **CONVERSION control statement:**

Character conversion is also referred to as conversion between specified CCSIDs. An application such as DB2 invokes the CUNLCNV function to convert characters between the specified code pages. You must identify the conversions that are possible on the CONVERSION control statement.

**Important:** Specify CONVERSION statements for DB2 as follows:

```
CONVERSION xxx,yyy,ER;  
CONVERSION yyy,xxx,ER;
```

Many code page conversions are possible. However, when identifying the conversion that DB2 is to use, you need be concerned only with conversion for the national languages that you use and with conversion from these code pages to and from all Unicode CCSIDs.

**Example:** If you use an EBCDIC CCSID of 37 and an ASCII CCSID of 819, you need to use the following conversions:

```
CONVERSION 37,367,ER;  
CONVERSION 37,1208,ER;  
CONVERSION 37,1200,ER;  
CONVERSION 367,37,ER;  
CONVERSION 1208,37,ER;  
CONVERSION 1200,37,ER;  
  
CONVERSION 819,367,ER;  
CONVERSION 819,1208,ER;  
CONVERSION 819,1200,ER;  
CONVERSION 367,819,ER;  
CONVERSION 1208,819,ER;  
CONVERSION 1200,819,ER;
```

Multiple conversion tables might be available for converting one CCSID to another. A technique search order can be used to specify which table should be used. The technique search order consists of up to eight technique characters. If you specify more than one technique character, the image generator tries to find a matching table for the leftmost technique character in the sequence of the technique-search-order. If one is not found, the search continues with the second one, and so on. Especially for mixed conversion, use more than one technique character because one of the subconversions might exist only in round-trip mode, and one might exist only in an enforced subset. In this case, a technique search order of 'RE' or 'ER' would be required. Technique search order is optional. If you do not specify a technique search order, RECLM is used.

Language products such as Enterprise Cobol might use the RECLM technique search order, while DB2 uses the ER technique search order. Therefore, you might also need to add the RECLM conversions, such as these:

```
CONVERSION 1047,850,RECLM; /* EBCDIC -> ASCII */  
CONVERSION 850,1047,RECLM; /* ASCII -> EBCDIC */
```

The important technique characters for DB2 are E (enforced subset) and R (round-trip). Enforced subset conversions map only those characters from one CCSID to another that have a corresponding character in the second CCSID. All other characters are replaced by a substitution character. Round-trip conversions between two CCSIDs assure that all characters making the 'round trip' arrive as they were originally, even if the receiving CCSID does not support a given character. Round-trip conversions ensure that code points that are converted from CCSID A to CCSID B, and back to CCSID A are preserved, even if CCSID B is not capable of representing these code points.

After performing these steps, you should now have an updated CUNJIUTL JCL member.

3. Submit the batch job in the CUNJIUTL member. At completion, the batch job writes its output to the SYSPRINT DD (that is, SYSOUT in this example). Expect a return code of zero from the CUNJIUTL program. If you receive anything other than return code zero, refer to Return code meanings. This information helps you correct environmental, syntactical, and semantic errors that might occur.
4. After generating the conversion image, copy it to SYS1.PARMLIB or any other data set in the logical PARMLIB concatenation. In this example, you copy *hlq*.IMAGES(CUNIMG00) to SYS1.PARMLIB(CUNIMG00).
5. Calculate the storage that is needed for a conversion image. When the conversion image is created on disk, you need to determine the amount of virtual storage that the image is to occupy. You specify this number as the number of pages on the REALSTORAGE parameter in the CUNUNIxx PARMLIB member that you create in the next step. The REALSTORAGE parameter protects the system from a shortage of main storage caused by loading a conversion image that exceeds the amount of available storage. The minimum value for the REALSTORAGE parameter depends on how the image is activated.

- If the image is activated during IPL, the needed storage is the size of the image plus one page.
- If the image is activated using the SET UNI command (PARMLIB member with keyword IMAGE), the needed storage is the size of the currently active image plus the size of the new conversion image.

If you set up a conversion environment before or if you are not activating a conversion environment during IPL, you must determine the amount of storage that the currently active image occupies. To do this, issue the following command:

```
D UNI,STORAGE
```

The system displays the number of active pages.

To determine the storage that the new conversion image occupies, find the CUN1017I message in the SYSPRINT log that was created in the previous step. This message indicates the number of pages that are required for the new conversion image. For example:

```
CUN1017I GENERATED IMAGE SIZE 291 PAGES.....
```

As an alternative, specify a REALSTORAGE value of zero, which indicates that unlimited storage is available. In this case, a value of 524 287 pages is used.

6. Create the PARMLIB member CUNUNIxx (PARMLIB member for activating a conversion environment). Normally the member is created in SYS1.PARMLIB, but in this case, you create it in another data set in the logical PARMLIB concatenation. This example uses SYS1.PARMLIB.

The xx can be any two alphanumeric characters, or the special characters @, #, or \$. This example uses 00. Here is the sample PARMLIB member in SYS1.PARMLIB(CUNUNI00):

```
REALSTORAGE 292;
IMAGE CUNIMG00;
```

Because CUNMIUTL requires 291 pages, and an additional page is required during IPL, the REALSTORAGE statement indicates that 292 pages of real storage are required.

The IMAGE parameter indicates that the system searches in SYS1.PARMLIB (or a data set in the logical concatenation) member CUNIMG00 for the conversion image.


You can create a PARMLIB member to delete a current conversion environment.

7. Take one of the following actions:
  - Edit IEASYSxx.
 


This parameter specifies one or more CUNUNIxx PARMLIB members that contain the keywords that configure the conversion environment. Each suffix xx identifies one CUNUNIxx member in the PARMLIB concatenation. If several PARMLIB members are specified, they are concatenated in the specified sequence. The concatenated contents is handled internally as a single member. This means that the lines are numbered consecutively, and error messages about syntax errors refer to the concatenated text. Restrictions for keywords apply for the entire concatenated text.
  - Check parameter MAXCAD in IEASYSxx. It limits the amount of common data spaces in a system. If MAXCAD is specified, consider that z/OS support for Unicode creates up to two common data spaces.
8. Initialize the conversion environment with an IPL.
9. After the system is initialized, you can use the DISPLAY UNI system command to show the current z/OS Unicode status or use the SET UNI system command to change the conversion environment.



**Related concepts:**

 Calling the character conversion services (z/OS: Unicode Services User's Guide and Reference)

**Related reference:**

 Creating a Unicode Services environment (z/OS: Unicode Services User's Guide and Reference)

## EBCDIC and ASCII support

DB2 supports both EBCDIC and ASCII encoding of data.

If you specify MIXED DATA = NO on panel DSNTIPF, you can use any compatible SBCS CCSID in the EBCDIC CCSID and ASCII CCSID fields. The first table below lists a selection of common SBCS CCSIDs that might be used as source or target CCSIDs for EBCDIC or ASCII data. DB2 does not support the storing of data into all of these CCSIDs. That is, not all of the numbers listed in the first table below are supported as target CCSIDs in conversion. When you choose CCSIDs, you should choose an EBCDIC CCSID and an ASCII CCSID that are listed in the same row in the first table below.

To determine which combinations DB2 supports with SYSSTRINGS, issue the following SQL statement:

 **GUPI**

```
SELECT * FROM SYSIBM.SYSSTRINGS;
```

 **GUPI**

If you specify MIXED DATA=NO on installation panel DSNTIPF, specify an SBCS CCSID from the second table below in the EBCDIC CCSID field on DSNTIPF. You must specify a SBCS CCSID from the third table below in the ASCII CCSID field on DSNTIPF. Mixed character data and graphic data cannot be defined on a system when you specify MIXED DATA=NO.

If you specify MIXED DATA=YES on installation panel DSNTIPF, specify a mixed data CCSID from the second table below in the EBCDIC CCSID field on DSNTIPF. You must specify a mixed CCSID from the third table below in the ASCII CCSID field. The second and third tables below show the associated CCSIDs that DB2 assigns for SBCS and DBCS data when you specify a specific MCCSID.

Then specify a mixed CCSID from the third table in the ASCII CCSID field on DSNTIPF. By specifying a CCSID for mixed data (an MCCSID), you also receive system CCSIDs for SBCS and DBCS (graphic) data.

In the second and third tables, four CCSIDs are listed for Japanese to allow for all possible combinations of two single-byte code pages and two double-byte character sets. The difference between the single-byte code pages is in the code points for lowercase Latin letters and Katakana characters. In the code page for Japanese (Extended English, SCCSID 1027), lowercase letters have the same code points as other EBCDIC code pages.

In these tables, the terms are used as follows:

**SCCSID**

single-byte coded character set identifier

**MCCSID**

mixed coded character set identifier

**GCCSID**

graphic coded character set identifier

*Table 169. Single-byte coded character set identifiers (CCSIDs)*

<b>Country or national language</b>	<b>EBCDIC</b>	<b>ASCII PC</b>	<b>ASCII AIX®</b>	<b>ASCII Windows</b>
Australia (U.S. English)	37/1140*	437	819	1252/5348*
Austria (German)	273/1141*	850/858*	819	1252/5348*
Belarus (Cyrillic)	1025			1251/5347*
Belgium	500/1148*	850/858*	819	1252/5348*
Bosnia and Herzegovina (Cyrillic)	1025			1251/5347*
Bosnia and Herzegovina (Latin)	870	852	912	1250/5346*
Brazil (U.S. English)	37/1140*	850/858*	819	1252/5348*
Bulgaria (Cyrillic Multilingual)	1025			1251/5347*
Canada (U.S. English)	37/1140*	850/858*	819	1252/5348*
Croatia	870	852	912	1250/5346*
Czech Republic	870	852	912	1250/5346*
Denmark	277/1142*	850/858*	819	1252/5348*
Finland (Swedish)	278/1143*	850/858*	819	1252/5348*
France	297/1147*	850/858*	819	1252/5348*
Germany	273/1141*	850/858*	819	1252/5348*
Greece	875 or 423	869	813	1253/5349*
Hungary	870	852	912	1250/5346*
Iceland	871/1149*	850/858*	819	1252/5348*
International Latin-1	500/1148*			
Israel	424	862	916	1255/5351*
Italy	280/1144*	850/858*	819	1252/5348*
Latin America (Spanish)	284/1145*	850/858*	819	1252/5348*
FYR Macedonia	1025			1251/5347*
Netherlands (U.S. English)	37/1140*	850/858*	819	1252/5348*
New Zealand (U.S. English)	37/1140*	437	819	1252/5348*
Norway	277/1142*	850/858*	819	1252/5348*

Table 169. Single-byte coded character set identifiers (CCSIDs) (continued)

Country or national language	EBCDIC	ASCII PC	ASCII AIX®	ASCII Windows
Poland	870	852	912	1250/5346*
Portugal (U.S. English)	37/1140*	850/858*	819	1252/5348*
Russia (Cyrillic)	1025			1251/5347*
Serbia and Montenegro (Cyrillic)	1025			1251/5347*
Serbia and Montenegro (Latin)	870	852	912	1250/5346*
Spain	284/1145*	850/858*	819	1252/5348*
Sweden	278/1143*	850/858*	819	1252/5348*
Switzerland	500 /1148*	850/858*	819	1252/5348*
Thailand	838			
Turkey (Latin 5)	1026	857	920	1254/5350*
United Kingdom	285/1146*	850/858*	819	1252/5348*
U.S.A. (U.S. English)	37/1140*	437	819	1252/5348*

Note: \* This number represents the equivalent CCSIDs using the euro symbol.

Table 170. EBCDIC double-byte coded character set identifiers (CCSIDs)

National language	MCCSID	SCCSID	GCCSID	User-defined characters
Japanese (Extended Katakana)	930	290	300	4370
Japanese (Katakana-Kanji)	1390	8482	16684	6205
Japanese (Extended Katakana)	5026	290	4396	1880
Japanese (Extended English)	939	1027	300	4370
Japanese (Latin-Kanji)	1399	5123	16684	6205
Japanese (Extended English)	5035	1027	4396	1880
Korean	933	833	834	1880
Korean	1364	13121	4930	1880
Simplified Chinese	935	836	837	1880
Simplified Chinese	1388	13124	4933	1880
Traditional Chinese	937	28709	835	6204

Table 171. ASCII double-byte coded character set identifiers (CCSIDs)

National language	MCCSID	SCCSID	GCCSID	User-defined characters
Japanese	932	897	301	1880
Japanese (Extended)	942	1041*	301	1880
Japanese (Open environment)	943	1041*	941	1880
Japanese (HP)	5039	1041*	1351	940
Korean	949	1088	951	1880
Korean (EUC)	970	367	971	1880
Korean	1363	1126	1362	1880
Simplified Chinese	1381	1115	1380	1880
Simplified Chinese (EUC)	1383	367	1382	
Simplified Chinese	1386	5210	1385	1880
Traditional Chinese	938	904	927	6204
Traditional Chinese	948	1043	927	6204
Traditional Chinese (IBM Big-5)	950	1114	947	

Note: \* The SCCSID 1041 is a superset of SCCSID 897.

## Implications of character conversions

Some character conversions have implications that you should be aware of. For example, when a character string is converted to another encoding scheme, the converted string might have a different length from the source string. In this case, the conversion is an *expanding conversion* or a *contracting conversion*.

**Expanding conversions:** An *expanding conversion* occurs when the length of the converted string is greater than that of the source string. For example, an expanding conversion occurs when an ASCII mixed data string that contains DBCS characters is converted to EBCDIC mixed data. Because of the addition of shift characters, an error occurs when an expanding conversion is performed on a fixed-length input host variable that requires conversion from ASCII mixed data to EBCDIC mixed data. The solution is to use a varying-length string variable with a maximum length that is sufficient to contain the expansion. Expanding conversions also can occur when string data is converted to or from Unicode.

**Contracting conversions:** A *contracting conversion* occurs when the length of the converted string is smaller than that of the source string. For example, a contracting conversion occurs when an EBCDIC mixed data string that contains DBCS characters is converted to ASCII mixed data due to the removal of shift characters. Contracting conversions also can occur when string data is converted to or from Unicode.

## Euro symbol support

DB2 enables users to migrate to CCSIDs that support the euro symbol. This support is limited to conversion from specific CCSIDs that do not define the euro symbol to specific CCSIDs that define the euro symbol.

**Attention:** If you want to migrate to CCSIDs that support the euro symbol, contact IBM Software Support. Altering CCSIDs without specific guidance from IBM Software Support is strongly discouraged.

The tables below list the ASCII and EBCDIC CCSIDs that can be converted to CCSIDs that support the euro symbol. In most cases, the euro symbol replaces an existing code point, such as the International Currency Symbol (ICS). Unicode UTF-8 (1208) and UTF-16 (1200) support the euro symbol. Unicode SBCS data (367) does not support the euro symbol.

The CCSIDs that you can modify are listed according to the encoding scheme. The first table below lists the EBCDIC CCSIDs, and the second table below lists the ASCII CCSIDs.

*Table 172. EBCDIC CCSID values that convert to euro CCSIDs*

CCSIDs without euro symbol	CCSIDs with euro symbol
37	1140
273	1141
277	1142
278	1143
280	1144
284	1145
285	1146
297	1147
500	1148
871	1149

*Table 173. ASCII CCSID values that convert to euro CCSIDs*

CCSIDs without euro symbol	CCSIDs with euro symbol
850	858
1250	5346
1251	5347
1252	5348
1253	5349
1254	5350
1255	5351
1256	5352
1257	5353
874	4970

You cannot convert other CCSIDs to CCSIDs that support the euro symbol. All databases and all table spaces within an encoding scheme should be altered at the same time.

If you migrate to a euro-enabled CCSID on DB2 and you have DB2 Connect clients, you should set the DB2CONNECT\_ENABLE\_EURO\_CODEPAGE environment variable on the client side.

**Related tasks:**

Updating subsystem parameter and application default values

---

## How an entry in **SYSIBM.SYSSTRINGS** works with character conversion

The catalog table **SYSIBM.SYSSTRINGS** contains information about character conversion. Each row in the table describes a conversion from one coded character set to another.

The following columns in **SYSSTRINGS** are relevant to character conversion.

**INCCSID**

The source CCSID of a character conversion.

**OUTCCSID**

The target CCSID of a character conversion.

**TRANSTYPE**

The type of conversion:

**SS** SBCS data to SBCS data  
**SM** SBCS data to EBCDIC MIXED data  
**MS** EBCDIC MIXED data to SBCS (EBCDIC and ASCII) data  
**PS** ASCII MIXED data to SBCS (EBCDIC and ASCII) data  
**GG** GRAPHIC data to GRAPHIC data  
**PM** ASCII MIXED data to EBCDIC MIXED data  
**MM** EBCDIC MIXED data to EBCDIC MIXED data  
**MP** EBCDIC MIXED to ASCII MIXED data  
**PP** ASCII MIXED to ASCII MIXED data  
**SP** SBCS (ASCII and EBCDIC) to ASCII MIXED data

**ERRORBYTE**

Specifies the byte that is used in the conversion table (**TRANSTAB**) as an error indicator. For example, if **ERRORBYTE** is **X'3E'**, that byte is used in the conversion table to indicate that no conversion is defined for code points that map to **X'3E'**. Null indicates the absence of an error indicator.

**SUBBYTE**

Specifies the byte that is used in the conversion table (**TRANSTAB**) as a substitution character. For example, if **SUBBYTE** is **X'3F'**, that byte is used in the conversion table as a substitute for code points that map to **X'3F'**. A warning occurs when a code point maps to the value of **SUBBYTE**. Null indicates the absence of a substitution character.

**TRANSPROC**

The name of a module or a blank string. If **IBMREQD** is **N**, a non-blank value of **TRANSPROC** is the name of a user-provided conversion procedure. If **IBMREQD** is **Y**, a non-blank value of **TRANSPROC** is the name of a DB2 module that contains DBCS conversion tables.

**IBMREQD**

**Y** indicates that the row is provided by IBM. **N** indicates that the row has been inserted by the user.

**TRANSTAB**

A 256-byte conversion table or an empty string.

Each row of **SYSSTRINGS** contains information about the conversion of character strings from the coded character set that is identified by **INCCSID** to the coded

character set that is identified by OUTCCSID. The conversion function is automatically invoked when a conversion from the coded character set that is identified by the INCCSID column to the coded character set that is identified by the OUTCCSID column is required.

For example, the row of SYSSTRINGS in which the value of INCCSID is 500 and the value of OUTCCSID is 37 describes the conversion from CCSID 500 to CCSID 37. The row in which the value of INCCSID is 37 and the value of OUTCCSID is 500 describes the conversion from CCSID 37 to CCSID 500.

DB2 enforces a distinction between IBM-supplied rows and user-provided rows with the following constraints:

- Rows with IBMREQD=Y cannot be updated or deleted.
- Rows with IBMREQD=N can be inserted, updated, and deleted.
- The same pair of CCSIDs can be in two rows, if one is in an IBM-supplied row and the other is in a user-provided row. In this case, the user-provided row is used for the character conversion.

The following table lists the types of rows that are possible in SYSSTRINGS.


*Table 174. Types of rows in SYSSTRINGS*

The value of TRANSPROC is	The value of TRANSTAB is	The value of IBMREQD is	The result is
blank	an empty string	–	No conversion is performed.
not blank	–	NO	Conversion is performed by the conversion procedure module name identified in the TRANSPROC column
blank	not empty	–	Conversion is performed by the DB2 module using the conversion table identified in TRANSTAB

Be aware of the following rules for SYSSTRINGS entries:

- An INSERT, UPDATE, DELETE, or LOAD is allowed only if IBMREQD=N.
- The values in the INCCSID and OUTCCSID columns must be in the range of 1 to 65533.
- For any given row, the INCCSID and OUTCCSID columns cannot contain the same value.
- The value in the TRANSTYPE column must be SS, SM, MS, PS, MM, PM, GG, MP, PP, or SP.
- For any given row, the ERRORBYTE and SUBBYTE columns cannot contain the same nonnull value.
- The TRANSPROC column must either be blank or contain a string that conforms to the rules for z/OS program names.
- The length that is specified in the TRANSTAB column must be either 0 or 256.

**Related reference:**

 z/OS XL C Support for the double-byte character set (XL C/C++ Programming Guide)

---

## Conversion-related changes that require remote packages to be rebound

Certain conversion-related changes at the local DBMS or at a remote DBMS might force the rebinding of a package.

These include the following changes:

- The system CCSID at the remote DBMS was changed. In this case, always rebound the package.
- The system CCSID at the local DBMS was changed. This could happen, for example, if the wrong system CCSID was specified during installation. If so, string constants in static SQL statements might have been converted incorrectly during the binding of the package. Rebinding corrects the conversion. Other problems might also arise as a result of the change. In most cases, you should rebound the package.
- The subtype of a character column is changed at the remote DBMS. The pertinent changes are from BIT to either SBCS or MIXED, and from SBCS or MIXED to BIT. The change was probably made by modifying the FOREIGNKEY column of the SYSIBM.SYSCOLUMNS table in the remote system catalog. Alternatively, the change might have occurred if the table was dropped and re-created with a different subtype (BIT to either SBCS or MIXED, or either SBC or MIXED to BIT) after the application was bound. A statement that refers to a column with a modified subtype might fail with an SQLCODE of -333. If this occurs, rebound the package containing the statement.

---

## Locales for uppercase and lowercase conversion of EBCDIC data

Rules for uppercase and lowercase usage vary according to language and country. A *locale* defines the subset of a user's environment that depends on language and cultural conventions.

DB2 uses the information that is associated with a locale to execute UPPER, LOWER, and TRANSLATE functions in a culturally correct manner. A locale consists of two components: the first component represents a specific language and country, and the second component is a CCSID.

**Example:** In the locale, Fr\_CA.IBM-1047, Fr\_CA represents the language and country (French Canadian), and IBM-1047 is the associated CCSID.

The symbol for euro currency is supported through the modifier @EURO.

**Example:** To display results in euro dollars instead of French Francs, specify Fr\_FR@EURO.

DB2 uses the SCEELKED and SCEERUN Language Environment (LE) libraries. Both libraries are PDS libraries and are for non-XPLINK linkage only. If you need to customize the locales using Language Environment libraries, see Internationalization: Locales and Character Sets (XL C/C++ Programming Guide).

The following table shows a partial list of locales that are supplied with z/OS C/C++. For a more complete list of locales, see Compiled locales (LE locales) (XL C/C++ Programming Guide).



Table 175. Examples of locales supplied with z/OS C/C++. Excerpt of table from z/OS C/C++ Programming Guide

Locale	Language	Country	Code set	Load module name
De_CH.IBM-500	German	Switzerland	IBM-500	EDC\$DCEO
De_CH.IBM-1047	German	Switzerland	IBM-1047	EDC\$DCEY
De_DE.IBM-273	German	Germany	IBM-273	EDC\$DDEB
De_DE.IBM-1047	German	Germany	IBM-1047	EDC\$DDEY
Fr_CA.IBM-037	French	Canada	IBM-037	EDC\$FCEA
Fr_CA.IBM-1047	French	Canada	IBM-1047	EDC\$FCEY
It_IT.IBM-280	Italian	Italy	IBM-280	EDC\$ITEG
It_IT.IBM-1047	Italian	Italy	IBM-1047	EDC\$ITEY
Ja_JP.IBM-290	Japanese	Japan	IBM-290	EDC\$JAEL
Ja_JP.IBM-930	Japanese	Japan	IBM-930	EDC\$JAEU
Ja_JP.IBM-939	Japanese	Japan	IBM-939	EDC\$JAEV
Ja_JP.IBM-1027	Japanese	Japan	IBM-1027	EDC\$JAEX

## Setting up z/OS to allow uppercase and lowercase conversion of Unicode and ASCII data

If you want to use the UPPER or LOWER built-in functions to process Unicode and ASCII data, you must complete additional setup. You must also complete additional setup if you want to use uppercase or lowercase conversions for characters other than A - Z or a - z.

### Procedure

To allow uppercase and lowercase conversion of Unicode and ASCII data:

Add control statements to the configuration of z/OS Support for Unicode services.

### Example

Assume that your EBCDIC CCSID is 37 and your ASCII CCSID is 819, and that you have defined the following conversions:

```
CONVERSION 37,367,ER;
CONVERSION 37,1208,ER;
CONVERSION 37,1200,ER;
CONVERSION 367,37,ER;
CONVERSION 1208,37,ER;
CONVERSION 1200,37,ER;
CONVERSION 819,367,ER;
CONVERSION 819,1208,ER;
CONVERSION 819,1200,ER;
CONVERSION 367,819,ER;
CONVERSION 1208,819,ER;
CONVERSION 1200,819,ER;
```

Modify your conversion image as follows:

```
CASE NORMAL; /* normal casing */
CASE SPECIAL; /* additional locale-independent casing */
CASE LOCALE; /* additional locale-dependent casing */
```

```
CONVERSION 37,367,ER;  
CONVERSION 37,1208,ER;  
CONVERSION 37,1200,ER;  
CONVERSION 367,37,ER;  
CONVERSION 1208,37,ER;  
CONVERSION 1200,37,ER;  
CONVERSION 819,367,ER;  
CONVERSION 819,1208,ER;  
CONVERSION 819,1200,ER;  
CONVERSION 367,819,ER;  
CONVERSION 1208,819,ER;  
CONVERSION 1200,819,ER;
```

The three additional CASE statements provide the necessary infrastructure for the UPPER and LOWER functions to process Unicode data according to the Unicode Standard.

---

## Information resources for DB2 10 for z/OS and related products

Information about DB2 10 for z/OS and products that you might use in conjunction with DB2 10 is available online in IBM Knowledge Center or on library websites.

### Obtaining DB2 for z/OS publications

Current DB2 10 for z/OS publications are available from the following websites:

<http://www-01.ibm.com/support/docview.wss?uid=swg27019288>

Links to IBM Knowledge Center and the PDF version of each publication are provided.

DB2 for z/OS publications are also available for download from the IBM Publications Center (<http://www.ibm.com/shop/publications/order>).

In addition, books for DB2 for z/OS are available on a CD-ROM that is included with your product shipment:

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## Glossary

The glossary is available in IBM Knowledge Center.

See the Glossary topic for definitions of DB2 for z/OS terms.



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