


Session: A02 & A03  
**Migration to DB2 9 for z/OS**

**IDUG 2008**  
Australasia

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**Experience IDUG**

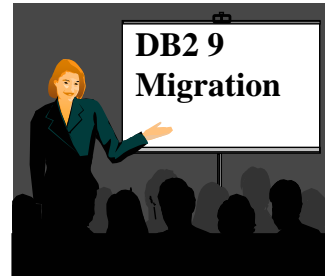
05 March 2008 • 01:00 p.m. – 02:00 p.m.  
Platform: DB2 for z/OS

DB2 9 for z/OS has many new features. This presentation will discuss planning to migrate to DB2 9, preparing to use the new functions. We assume that you know DB2 9. We'll emphasize process and recommendations from many other customers, with pointers to more information. The content of this session will focus on the tasks of the person who plans or installs DB2. Systems programmers and database administrators generally perform this task, but there is work for all DB2 users.

Special thanks to Bob Perih, Citigroup; Joan Keemle & Bryan Paulsen, John Deere; Akira Shibamiya, John Campbell and many others for their insights and presentations on migration. Session numbers (e.g. A12) in this presentation are from this conference or earlier conferences. Many are on the web (see slides 62 – 78).

## Migration Staging

- Planning:
  - Education for planning, Plan to educate
  - Detailed project plan and communications
  - Install prerequisites
  - Find and fix incompatibilities
  - Plan virtual and real storage
  - Plan performance
- Migration: monitoring and tuning
- Implementation
  - Using new improvements to deliver value



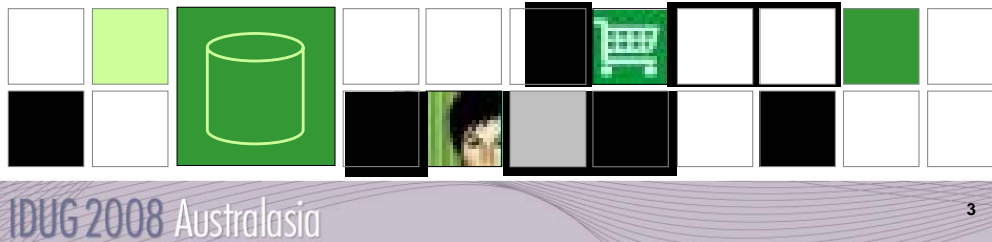
The primary stages of migration to a new version are planning, migration and implementation of the new improvements. This presentation will focus on the planning.

The key items are making sure that everyone is educated, with what they need to succeed. A detailed project plan and communication to all involved are crucial for success. Some of the preparation can occur very early, understanding, obtaining and installing the prerequisites. Applications can make needed changes over a longer period to make the process easier and less costly. Plans for monitoring virtual and real storage as well as performance are necessary. An early health check, communication of the needed changes and staging of the work will make the project more successful.

## Why Migrate to DB2 9 for z/OS?



- Business needs
  - Reduce CPU time & disk space
  - Improve business agility
  - Service Oriented Architecture
- Application developers need
  - Powerful new SQL enhancements
  - Portability with SQL and data definition compatibility
  - PureXML for a powerful SQL and XML interface to XML data
- Database Administrators need
  - Improve availability and performance
  - More flexible security and easier regulatory compliance
  - Better web application & data warehouse function and performance
  - LOB function, performance, usability



DB2 9 has a lot for everyone. Here are just a few of the highlights.

The business needs include CPU cycle reductions that deliver in most utilities, improved query optimization, improved business agility via faster implementation cycles, and new pureXML™ that builds a strong foundation for SOA and XML initiatives. Kevin Campbell, an Application Architect at Univar USA said it better than I can, “This is not a bolt-on or band-aid approach, DB2 9 for z/OS is XML without compromise.”

Database Administrators (DBAs) need improved database availability and performance including LOBs, reorganization, backup and recovery, and partitioning enhancements. DBAs also get more flexible trusted network context and role-based security to help with regulatory compliance. A wide range of enhancements improve ERP application and data warehouse functionality and performance. Large object (LOB) function is added with file reference variables and REORG, while performance is improved.

Application developers are most excited by PureXML, which adds a powerful SQL and XML interface to access XML data stored in a native format. Application developers need powerful new SQL enhancements including MERGE and TRUNCATE statements, INTERSECT and EXCEPT set operations, and spatial support for geographical data. Text handling is improved with the XML changes, many new built-in functions, and an upcoming text server. Improved SQL and data definition compatibility with other DB2 platforms makes porting much easier.

## Common Challenges: DB2 for z/OS Migration

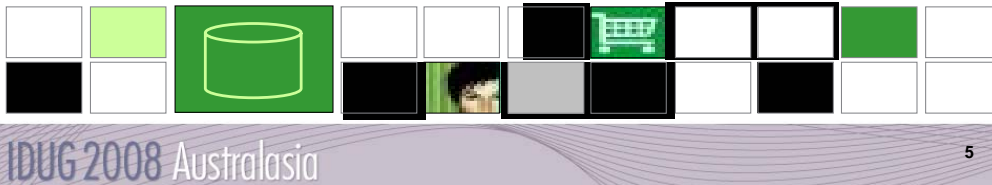
- Current product and tool support
  - Old COBOL or PL/I or tools
- Cleaning up incompatible change
- Real and virtual storage
  - Commit intervals, Calls, ...
- Plan, monitor and manage performance

These are the key items that every customer should check first, to see the most common items that slow down a migration to DB2 9. We will discuss each of these points in detail on later slides:

- Related product and tool support requires looking at the documentation, migrating from out-of-service products to the supported levels, and getting the correct releases and service installed. Talk with your vendors soon.
  - Old COBOL or PL/I is a common example of this situation. Compiles need to use current products. Omegamon V4 is needed for DB2 9. See details later in this presentation.
- Cleaning up incompatible changes takes time and a detailed understanding of your shop. Testing is needed.
- Real and virtual storage may improve a little. Planning is required. REBINDs are required to gain EDM space.
- Plan and monitor performance, as yours can improve substantially or degrade on migration. Be ready to do the needed work.

## Migration to DB2 9 for z/OS is easier *than v7 to v8*

- Migration process enhancements: ENFM shorter, CM\*
- Much less performance regression:
  - Earlier improvements
  - Plan stability & tools for avoiding access path issues
- CCSIDs and old product issues resolved in V8
- Simpler virtual storage considerations
- Less impact from incompatible changes
- Earlier deliveries from vendors



DB2 9 migration has been easier for many customers and tends to be faster than DB2 V8. Many customers note that the process and the quality are solid.

### Migration process enhancements

ENFM is shorter (10 minutes versus an hour), as only two table spaces need to be reorganized in this phase (versus 18 in V8 including the largest ones).

Drop back to CM\* if needed (no single steps without a drop back).

Much less performance regression

More consumable performance improvements

Utility CPU improvements in CM

Plan stability to reduce concern about access path regression.

CCSIDs and old product issues resolved in V8 migration, not a problem.

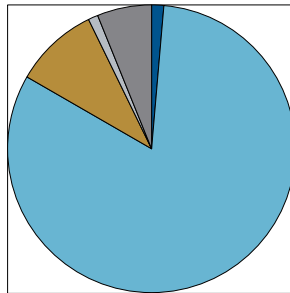
Simpler virtual storage considerations – incremental improvements.

Less impact from incompatible changes

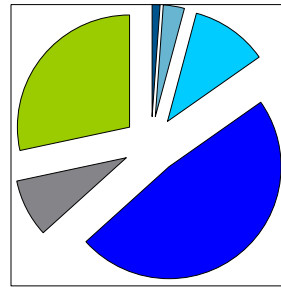
Many vendors are ready today.

## Customer reactions to DB2 9

IDUG webcast , 154 people responding (not NA)  
 100 or 65% moving to DB2 9 in next 12 months



Now on



DB2 9  
plans



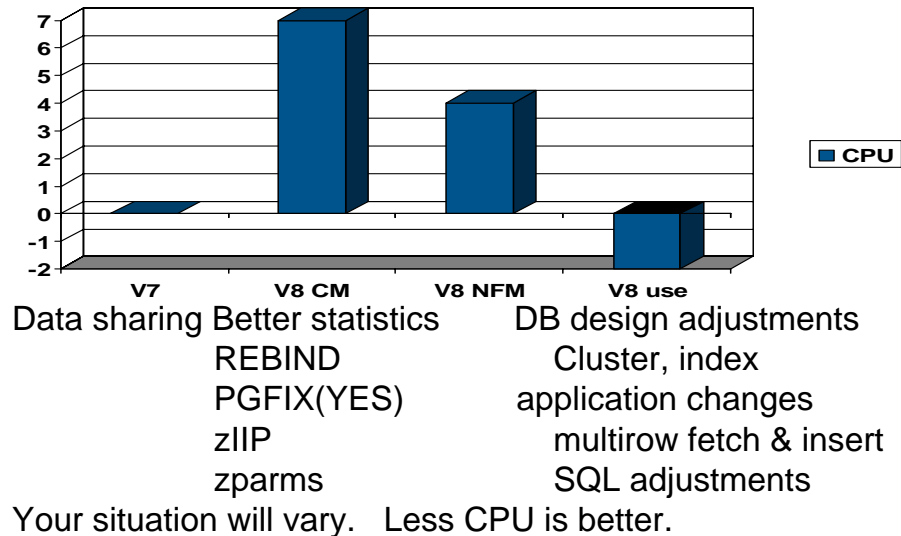
Notes from an IDUG webcast. Two questions were about DB2 9 migration. 154 people on the call answered the second question. Some consultants with no DB2 answered NA. When the question was asked about which version they are on,

- 2 answered 9.
- 123 answered V8.
- 14 answered V7,
- 2 answered older, and
- 9 answered NA.

When asked about plans for moving to DB2 9, removing NA (null) responses from the percentages:

- 1 said 9 production now;
- 5 said DB2 9 in test now (3%);
- 19 (12%) indicated migration to DB2 9 within 6 months;
- 81 (53%) indicated migration to DB2 9 within 6 - 12 months;
- 48 (31%) indicated no plans for DB2 9 migration;
- 
- 14 indicated NA.

## V8 best practice performance plan example scenario



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7

Your situation and mileage will vary, but this is a common shape for a V8 performance plan, starting with zero for the V7 base line. When you move to V8, CPU time generally increases from 5% to 10%, shown here as 7. Start with long term page fix for buffer pools with high numbers of pages read and written. Reorg and collect improved statistics for non-uniform distribution of data on non-indexed columns. The V8 CM performance plan REBINDs the primary packages, and adjusts DSNZPARMs. The CM REBIND process provides most of the improved access paths. Data sharing batching helps in CM. During CM, a zIIP is added if your peak work load includes DRDA SQL, parallel query or LOAD, REORG and REBUILD.

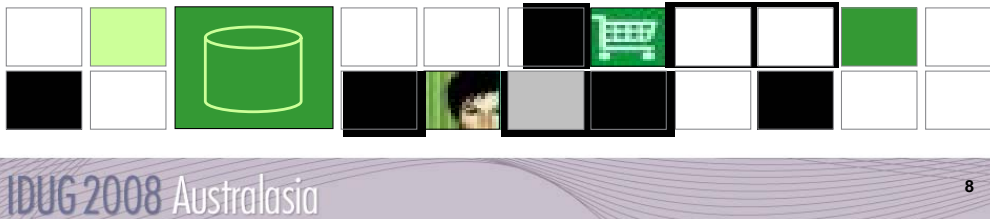
In moving to NFM, some additional DSNZPARMS are adjusted and REBIND all plans and packages. Database designs start taking advantage of new clustering & indexing options, such as NOT PADDED for large varchar indexed columns. After making the design changes, REORG the data; REORG or REBUILD the indexes; get improved statistics & REBIND. The data sharing group is quiesced, and protocol 2 locking is used.

V8 use takes more advantage of the V8 performance improvements: MQTs, DPSI, more not-padded indexes, multi-row Fetch, cursor Update, cursor Delete, & Insert. Use other SQL improvements to reduce V8 CPU, less than V7. The work may grow, but some of the growth uses the zIIP.

## Most consumable DB2 9 improvements



- CM very little to no action:
  - Utility CPU reductions
  - Logging improvements
  - Improved index page split
  - Larger prefetch, write & preformat quantities
  - LOB performance
  - DDF VSCR
  - Optimization Service Center & Opt. Expert
- Changed online REORG
- Improved RUNSTATS
- Optimization improvements, EDMPOOL VSCR
- NFM
- REOPT(AUTO) dynamic SQL
- Reordered row format
- Index: larger page sizes, compression, index on expression
- LOB lock avoidance



Here are some highlights for items that deliver the most quickly and easily:

Very little to no action is required for the utility CPU reductions, logging improvements, improved index page split, larger prefetch, write & preformat quantities, some LOB performance, DDF virtual storage constraint relief. The first group delivers in CM.

The next items require some work. Changed online REORG and other utility improvements require process changes and use of SHRLEVEL(CHANGE).

Improved RUNSTATS statistics needs some analysis to determine where the value is greater than the cost of gathering the new statistics.

Optimization improvements are automatic for dynamic SQL, but require work to REBIND for static SQL. In both cases, we need baselines to check for regression. REOPT(AUTO) for dynamic SQL needs analysis to be sure the improvement is working. EDMPOOL virtual storage constraint relief also requires a REBIND.

Optimization Service Center takes some learning, but should be fast for those who have used Visual Explain in the past. See the new redbook, SG24-7421, DB2 9 for z/OS: New Tools for Query Optimization.

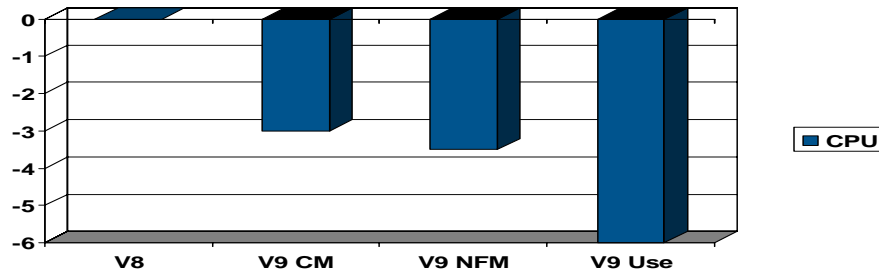
Reordered row format requires a REORG in NFM and varying length columns.

Index improvements for larger page sizes, compression, index on expression require database design work to determine where they are applicable. ALTERs, REORGs and creation of new indexes are needed.

LOB lock avoidance requires a quiesce of all subsystems in NFM.



## DB2 9 z9, z890 & z990 performance plan example scenario

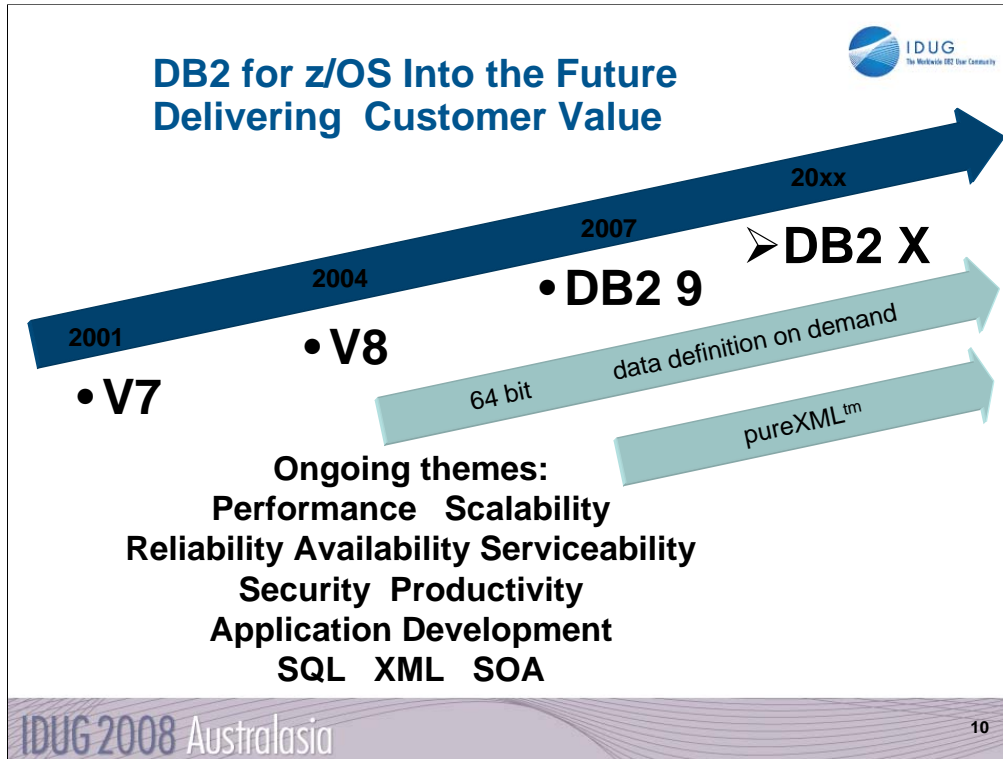


Utilities	DB design adjustments
Histogram statistics	Index improvements
REBIND	application changes
DSNZPARMS	native SQL procedures
	SQL adjustments

Your situation will vary. Less CPU is better.  
z800 and z900 expect +5% to +10% CPU

If you have a z9, z990 or z890, this is expected to be a common shape for a DB2 9 performance plan, starting with zero for the V8 baseline. When you first move to DB2 9, total DB2 CPU time generally decreases from 0% to 5% for z9, z890 and z990 customers, shown here as a first step -3%. Utility CPU reductions help immediately. Some work will be about the same (+/-3%). Start with reorgs and collect improved histogram statistics when useful. The DB2 9 CM performance plan REBINDs the primary packages and adjusts DSNZPARMs. The REBINDs provide most of the improved access paths. On z800 or z900 the initial cpu expectation is +5 to +10% regression, more if there are many columns, so making adjustments is more important. In moving to NFM, some additional DSNZPARMs are adjusted and all plans and packages are rebound. The DB2 9 use line takes wider advantage of DB2 9 performance improvements. Database designs start taking advantage of new indexing options, such as compression, index on expression and larger pages. After making the design changes, REORG the data and REORG or REBUILD the indexes, get the improved statistics and REBIND. Native SQL procedures, added use of zIIP, and improved SQL continue the improvements in this phase.

Scenario: Customer mix of DB2 CPU time is 30% in utilities, 70% in SQL access. With 10% improvement for the utilities, we get a -3% net, assuming that SQL is the same as before. With optimization improvements, another -½% improvement shows up in DB2 9 NFM. Then as design adjustments, reorgs and rebinds are performed, we get improvements from varchar improvements, native SQL procedures and improved SQL, another -3%.



DB2 for z/OS V7 became generally available (GA) March 2001, and V8 delivered three years later, March 2004. DB2 9 became generally available in March 2007, three more years. We expect the next version will be roughly 3 years from DB2 9 GA to DB2 10 or DB2 X or whatever the name becomes, but the timing and packaging may change too.

The themes for future versions will continue to focus on core platform strengths of performance, scalability, reliability, stability, availability, resilience, and security. PureXML and Schema evolution or data definition on demand will be ongoing for a long time. In contrast, most of the 64 bit evolution should be completed in DB2 X.

The key interfaces for customers and vendors expand for both XML and for SQL. Information is a key leg of the SOA platform, and DB2 for z/OS provides many advantages for data management in SOA.

Standards, interoperability, portability and security along with secure access using the latest technologies are key touch points. Productivity improvements for application developers and for database administrators are very important as data grows in scale and complexity.

## DB2 for z/OS Version Availability Summary

Version	PID	Generally Available	Marketing Withdrawal	End of Service
V3	5685-DB2	Dec. 1993	February 2000	March 2001
V4	5695-DB2	Nov. 1995	Dec. 2000	Dec. 2001
V5	5655-DB2	June 1997	Dec. 2001	Dec. 2002
V6	5645-DB2	June 1999	June 2002	June 2005
V7	5675-DB2	Mar. 2001	<b>Mar. 2007</b>	<b>June 2008</b>
V8	5625-DB2	Mar. 2004		
DB2 9	5635-DB2	<b>March 2007</b>		

All statements regarding the future direction and intent of IBM are subject to change or withdrawal without notice and represent goals and objectives only. This table summarizes the latest versions of DB2. As of March 2007, DB2 V7 has been generally available for six years. DB2 V8 has been generally available for over three years. If you are currently running V7, then it's time to plan your migration to V8. I generally think of five years after general availability as the end of practical life for a DB2 release. Migration to DB2 9 is only from DB2 for z/OS V8. There is no ability to skip a version. There are a few customers still running older versions, but the end of service is past. In general, you can expect versions to be in service for five years and end of service to be announced a year in advance.

If you want to search for these products by version number, the PID number is useful. Most large customers are running V8 now. End of service of Version 7 is June 2008, after end of service for all of the operating systems that support processors other than System z or zSeries.

To see current DB2 availability notices, start at [ibm.com/software/db2zos](http://ibm.com/software/db2zos). Click on Support, then on Product Life Cycle. [ibm.com/software/data/db2/zos/support/plc/](http://ibm.com/software/data/db2/zos/support/plc/)

## z/OS Support Summary



z/OS	z800 z900	z890 z990	z9 EC z9 BC	z10 EC	DS8000 DS6000	TS1120	End of Service	Coexists with z/OS...	Ship Date
R6	x	x	x	x	x	x	9/07	1.8	
R7	x	x	x	x	x	x	9/08	1.9	
R8	x	x	x	x	x	x	9/09*	1.10*	
R9	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>	9/10*	1.11*	9/07
R10*	x	x	x	x**	x	x	9/11*	1.12*	9/08*
R11*	x	x	x	x	x	x	9/12*	1.13*	9/09*

z/OS 1.9 Coexistence-supported releases

**Release**      **Coexistence-supported**

z/OS 1.9      z/OS 1.7, z/OS 1.8, z/OS 1.9

z/OS 1.10\*      z/OS 1.8, z/OS 1.9, z/OS 1.10\*

z/OS 1.11\*      z/OS 1.9, z/OS 1.10\*, z/OS 1.11\*

z/OS.e 1.7, 1.8 supported on z800, z890, and z9 BC only. There is no z/OS.e 1.9.

### z/OS 1.9 Coexistence-supported releases\*

**Release**

z/OS 1.9

z/OS 1.10\*

z/OS 1.11\*

**Coexistence-supported**

z/OS 1.7, z/OS 1.8, z/OS 1.9

z/OS 1.8, z/OS 1.9, z/OS 1.10\*

z/OS 1.9, z/OS 1.10\*, z/OS 1.11\*

z/OS.e 1.3 - 1.8 supported on z800, z890, and z9 BC only. There is no z/OS.e 1.9

x1 – IBM eServer™ zSeries® 990 (z990) compatibility or exploitation feature required (no longer orderable)

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This chart summarizes much of the information about z/OS that you need to know. Server and DASD hardware support, end of service dates, coexistence, and planned availability dates are shown here for existing and planned releases through z/OS R9.

z/OS 1.8 was announced and became available in September 2006. 1.8 is required for some DB2 9 function. z/OS 1.9 became available in September 2007.

**z/OS 1.6 is out of service as of September 2007. 1.4 and 1.5 are out of service as of March 2007. z/OS (and z/OS.e) 1.7 planned end of service is September 2008\***

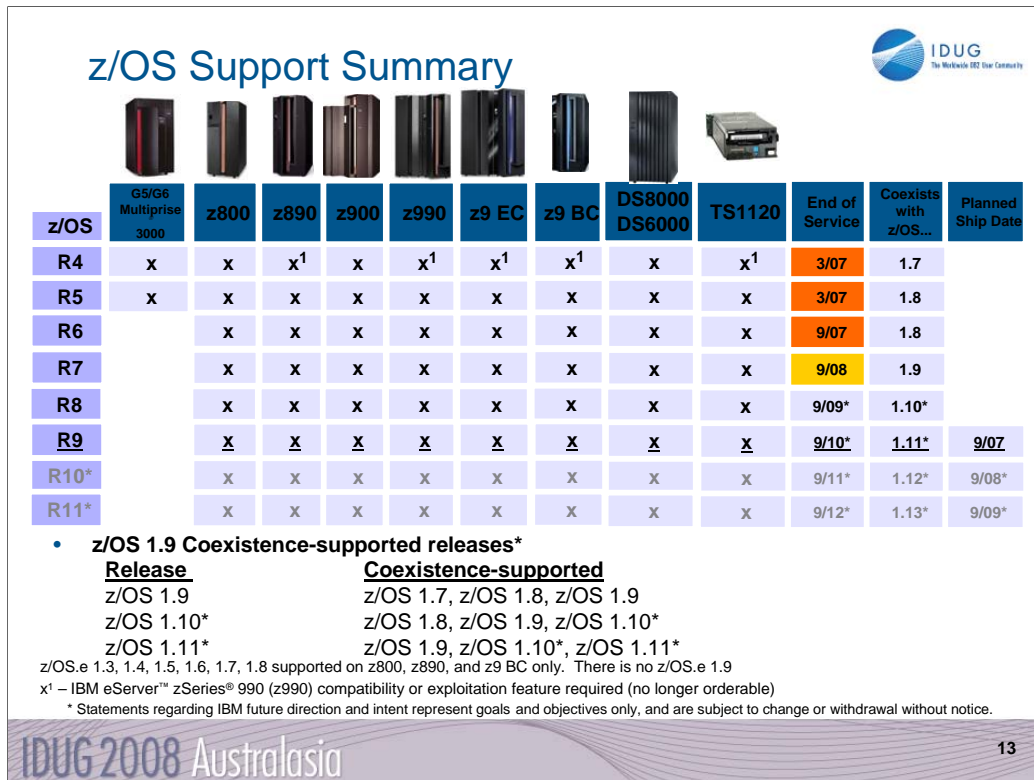
Only service-supported releases can coexist in the same sysplex

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This chart notes the support for z/OS with various processors.

Note the z/OS end of service dates as well. End of service for z/OS 1.3 was March 2005. Check the latest information by going to the z/OS web page, then to Support and then to the z/OS marketing and service announce, availability, and withdrawal dates

[http://www.ibm.com/servers/eserver/zseries/zos/support/zos\\_eos\\_dates.html](http://www.ibm.com/servers/eserver/zseries/zos/support/zos_eos_dates.html)



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[http://www.ibm.com/servers/eserver/zseries/zos/support/zos\\_eos\\_dates.html](http://www.ibm.com/servers/eserver/zseries/zos/support/zos_eos_dates.html)

Staged Migration process: similar to best practice

- **Test with New Install & Migrate (sandbox)**
- **Migrate to new release in Compat Mode (1 – 2 months)**
- **New Function Mode (NFM)**
  - Enable New Function Mode (minutes)
  - Move into NFM
- **Deliver value. Take advantage of new function.**



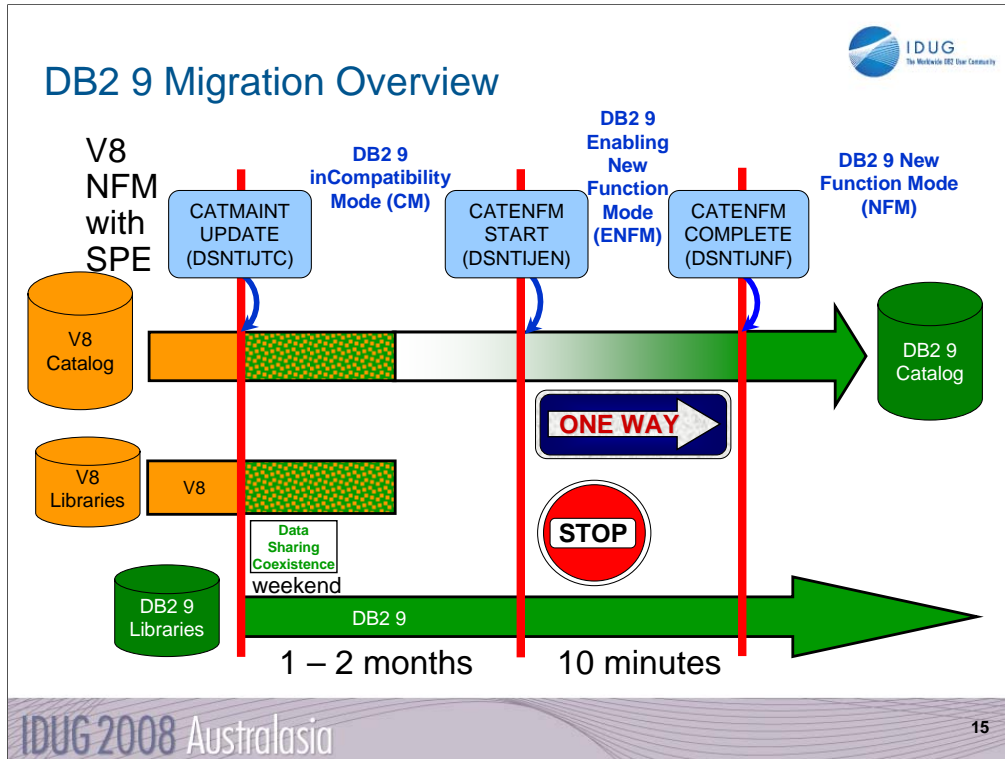
The process of migration will take four major steps.

Use a new install or a migration on a separate subsystem and practice migration there. Test the function you want to use. This will ensure that you are ready to move forward.

Migrate to the new release in “Compatibility Mode” (CM). You are using the new code but almost no new function. Compat mode is NOT no new function mode. The primary objective is making the full migration smooth, so we prefer to avoid problems, but if they can’t be avoided, then CM is much better than NFM

The third step is a few minutes for Enabling New Function Mode (ENFM), typically a one hour process, moving directly to the next, New Function Mode or NFM.

After you are running New Function Mode (NFM), then one or more projects are used to deliver the value of V8 or 9, improving performance, availability and new capabilities in SQL, XML and utilities.



The time line is not to scale. Customers should spend only a few minutes in ENFM and then move immediately to NFM.

The ONE WAY situation is a bit more flexible, with more opportunity to drop back. There are two new modes to denote drop back processes. You can drop back from NFM to ENFM as before, but the label for the drop back mode is now ENFM\*. It is also possible to drop back from ENFM or NFM to CM\*, but not to V8 or to coexistence.

## DB2 9 Modes – An Overview

**CM “inCompatibility” Mode** - This is the DB2 mode DB2 9 migrated from V8 and is started for the first time. It will still be in CM when migration job DSNTIJTC has completed. Very little new function can be executed in CM. Data sharing systems can have V8 and DB2 9 members in this mode, called coexistence. Coexistence should be very short, such as a weekend or a week. DB2 can only migrate to CM from V8 NFM. This mode is not so much compatibility, as the ability to fall back. We try to move most (but not all) problems for migration from NFM to CM, so that fallback can be used, if necessary.

**ENFM Enabling New Function Mode** - This mode is entered when CATENFM START is executed (the first step of job DSNTIJEN). DB2 remains in this mode until all the enabling functions are completed. Data sharing systems can only have DB2 9 members in this mode.

**NFM New Function Mode** - This mode is entered when CATENFM COMPLETE is executed (the only step of job DSNTIJNF). This mode indicates that all catalog changes are complete and new function can be used.

**ENFM\*** This is the same as ENFM but the \* indicates that at one time DB2 was at NFM. Objects that were created when the system was at NFM can still be accessed but no new objects can be created. When the system is in ENFM\* it can not fallback to V8 or coexist with a V8 system.

**CM\*** This is the same as CM but the \* indicates that at one time DB2 was at a higher level. Objects that were created at the higher level can still be accessed. When DB2 is in CM\* it can not fallback to V8 or coexist with a V8 system.

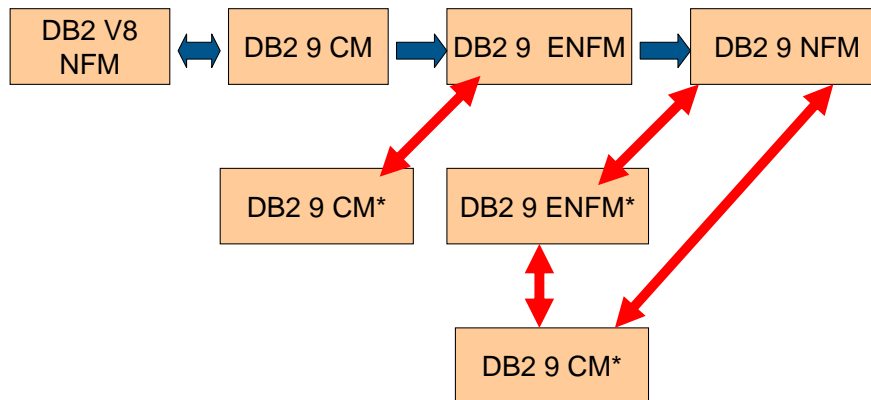
DB2 9 builds upon the structure from V8. The modes are almost the same, but DB2 9 clarifies the situation if you drop back after moving to ENFM or NFM. There are two more modes with names CM\* and ENFM\*, and the restrictions are clarified a little more. The process is very similar to the best practice that successful customers have used for years. It is possible to move from NFM or ENFM to CM\*.

While the first mode is labeled as “Compatibility Mode” or CM, it is not compatible. CM does help with the conversion, but the incompatibilities have been moved to this mode, where possible, since fallback is simple from this stage. This change removed problems in moving to ENFM and NFM.

I think of NFM as New Value Mode, the opportunity to deliver the value of the new version.



## Migration & Fallback Paths



CM is the mode when DB2 9 is started for the first time from DB2 V8 New Function Mode (NFM). Limited new function can be executed in CM. This is the only mode that permits fallback to DB2 V8. While this mode is labeled “Compatibility Mode“, CM is not compatible. CM does help with the conversion, but most incompatibilities occur in this mode, where possible, since fallback is simple from this stage.

Enabling New Function Mode (ENFM) is the mode that is entered when CATENFM START is executed which is the first step of DSNTIJEN. ENFM can fall back to a “Compatibility Mode” which is identified as CM\*.

New Function Mode (NFM) is the mode that DB2 enters once CATENFM COMPLETE is run. This is the only step of job DSNTIJNF. New functions can be used at this time. Fallback can occur to Enabling New Function Mode which will be identified as ENFM\* or to “Compatibility Mode” which will be identified as CM\*.

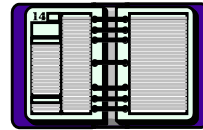
Enabling New Function Mode Star (ENFM\*) is the same as ENFM but indicates that at one time DB2 was in NFM.

Compatibility Mode Star (CM\*) is the same as CM but indicates that at one time DB2 was in either ENFM or NFM. You can not fallback to DB2 V8 from CM\*.

DB2 9 migration modes are C, C\*, E, E\*, or N in message DSN7100I

## Migration Strategy: Test and Production

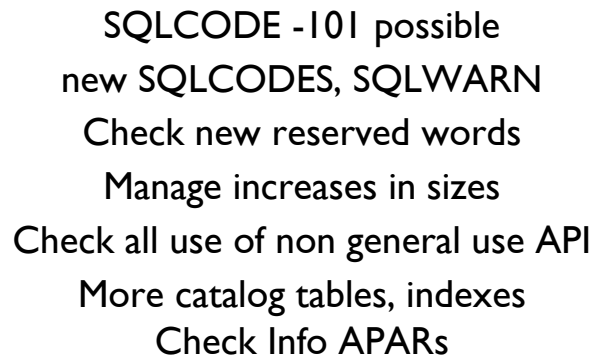
- Short time for data sharing coexistence
- One to two months for compatibility mode
  - ▶ Not able to use most new performance
- Short time for enabling new function mode
- Move to new function mode
  - ▶ Stage in new function
- Test to QA to Production
  - ▶ Better controls for not using new function
  - ▶ Still don't want long gap test to production
  - ▶ Vendor support may affect strategy, e.g. NFM certified
  - ▶ Improved granularity, stage by modes



In the past we have recommended a short time for data sharing coexistence, and that is still true. A short period for ENFM is also recommended highly. Support from vendors may affect the migration staging. One concern for compatibility mode is that most new performance improvements cannot be used, and some regression is possible, as always.

The timing for moving from test to QA to production has more options to consider. There are better controls for not using new function, but a long gap between test and production levels is not advisable. Now you have more granularity in the migration and can move mode by mode. Some customers are migrating both test and production to CM, then changing to NFM in a short time.

## DB2 considerations for any migration



SQLCODE -101 possible  
new SQLCODES, SQLWARN  
Check new reserved words  
Manage increases in sizes  
Check all use of non general use API  
More catalog tables, indexes  
Check Info APARs

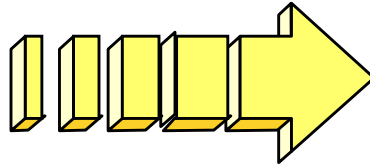
Whenever you move from one release to another, there are some changes to manage. It is possible, but rare to find SQL which processed in the prior release that will not run on the new one. If you have users who test the boundaries, instead of reading the limits, then this is more common. Reserved words are handled in context when possible, but new reserved words can cause problems in SQL that worked on the prior release. Check for APARs. The Info APAR for DB2 9 migration is I112423.

Some catalog tables grow. There are many more catalog tables and indexes. The concern for V8 was often the long names and Unicode, but the catalog growth for that was generally 10% or less. As you REBIND, the SPT01 and SYSPKAGE table spaces often grow 50%.

Error information changes more frequently, note any dependencies upon error information. There are always new SQLCODEs, and we still find a few applications that do not have tests for other cases. Additional complexity means that storage sizes increase in DB2 & application address spaces.

If you use an interface identified as a Product-Sensitive Programming Interface, it must be checked. If it's not in the books, then it's not an interface.

## Premigration Activity



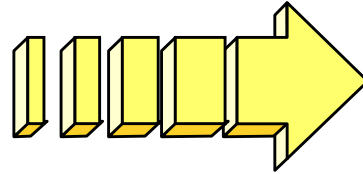
- ✓ Install prerequisite software & service
- ✓ Adjust for incompatibilities (DSNTIJPM)
- ✓ Identify unsupported objects
- ✓ Check new and changed parameters
- ✓ Save critical performance & access path info.
- ✓ Take backup copies

Before you start the SMP/E process you will want to look into the disk storage requirements.

Be sure you have installed all of the proper maintenance on DB2 V8 BEFORE you start to migrate, especially the APARs for migration and toleration of fallback (PK11129). Get the list of APARs or PTFs from that APAR or from the Info APAR.

The following foils and notes address each one of these points in more detail. Allow for plenty of time in your schedule to address these items. Your migration will run much more smoothly if you do.

## Premigration Activity ...



- Find problems with incompatibilities
  - ▶ It is important to look at these now because many have actions that you must address before migrating.
  - ▶ Get the complete list from the Installation Guide (Get the latest from the web).
  - ▶ Use V8 job DSNTIJP9    APAR PK31841

Read these pages of the DB2 Installation Guide carefully. Many items need to be addressed before migration. Check the items several times, including just before running CATMAINT.

General REBIND advice: When to REBIND depends upon complexity of the SQL, how well tuned the statements are, and your experiences with improvements & regression. For simple cases, a rule of thumb is that the statistics need to change by 10% or 20% or cross a key threshold to make a difference in the access path.

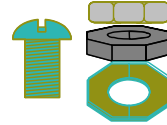
Real Time Statistics address when to run REORG, RUNSTATS & COPY. Read Administration Guide. Some rules of thumb & threshold techniques discussed in the book may be useful for REBINDs. One of the best times for RUNSTATS & REBIND is after REORG. If you update statistics & the differences are large or cross a boundary, then REBIND is more likely to make a difference. Statistics history tables may help in the decision. After REBIND, check access path & processing estimates.

## Install Prerequisite Software

- Prerequisites and Functional Needs

- ✓ All products need to be at proper maintenance level (prior DB2 release too)

- ◆ Migration & Fallback SPE APAR PK11129
    - ◆ Ensure that you apply all hiper APARS, PE fixes
    - ◆ Use the DB2 Program Directories, the Installation Guide, PSP (preventative service planning), web & Info APAR II12423

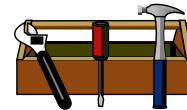


- ◆ Other software ...Talk to your Vendors

- ◆ z/OS R7 R8 R9



- ◆ Job DSNTIJPM or DSNTIJP9



You need to know what functions will be used first. Many functions have additional prerequisites. Read the section of Release Guide carefully to see if you need to upgrade other software. The most successful policy is to keep software at similar levels. z/OS should be current & in service. Some functions need later releases. z/OS V1R7 is minimum for DB2 9 and the minimum in service today.

IBM & other vendor software must be checked for levels required & needed for the function you want. Some APARs require vendor changes. Contact your vendors.

Program Directories:

<http://www.ibm.com/software/data/db2/zos/library.html>

<http://www.ibm.com/software/data/db2/zos/v9books.html>

## DB2 9 incompatibilities

### ➤ Installation Guide for details

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

##### ➤ Changes to DB2 that might impact your migration to DB2 9 compatibility mode

- Application and SQL release incompatibilities
- Utility release incompatibilities
- Command release incompatibilities
- Storage release incompatibilities
- Other release incompatibilities
- Functions that are no longer supported
- Functions that are deprecated
- Preparing a data sharing group or distributed environment for migration

#### ➤ Chapter 5. Installing or migrating DB2

##### ➤ Migrating your DB2 subsystem to new-function mode

##### ➤ Implications of converting to DB2 9 new-function mode

### ➤ Application Programming and SQL front

#### ➤ Application and SQL release incompatibilities

For detailed product dependencies and incompatibility descriptions, see

- Application Programming and SQL Guide (APSG)
- Installation Guide
- Program Directories
- Web page for DB2 9 books: <http://www.ibm.com/software/data/db2/zos/v9books.html>

Release incompatibilities are divided into incompatibilities in compatibility mode and incompatibilities in new-function mode and are documented in lists in two separate sections in the Installation Guide. Here are links to the two topics that contain these lists:

Parent topic for compatibility mode incompatibilities:

Changes to DB2® that might impact your migration to DB2 9 compatibility mode:

<http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.db29.doc.inst/dmigcn2.htm>

Parent topic for new-function mode incompatibilities:

<http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.db29.doc.inst/dmigcn2.htm>

Conversion considerations:

The Installation Guide section is about 18 pages long. Some of the items expected to be the most common are noted here, but your database administrators and application programmers should review the full list, as some practice might be common at your shop.

Application programmers should review the entire section in the APSG, about 9 pages long, with the primary changes that are anticipated to require changes. The following slides have the highlights.

## DB2 9 removed function

- DB2-managed stored procedures → WLM-managed SPs
- Create simple table space → create segmented (CM) or partition by growth (NFM)
- Temp databases & table spaces → work files
- Very old plans and packages (V3 and before) → REBIND
- AIV Extender → Content Management
- Text, Net Search Extenders → new text search
- Net.Data → WebSphere, REXX, command line proc., ...
- DB2 Estimator → capacity planning products
- Old JDBC / SQLJ driver → Current driver
- Online help → Information Center

DB2 9 for z/OS supports migration only from V8 NFM. Customers not yet running V8 should plan to migrate to DB2 for z/OS, V8 as preparation for migration to DB2 9. IBM added many data server capabilities in DB2 9 for z/OS and reduced or removed support for some functions: AIV Extender is removed. Text Extender is removed. Net Search Extender is removed. Net.data, which was stabilized at the V7 level, is removed. WebSphere is the strategic IBM solution for delivering DB2 data to Web applications. For some situations a scripting language, such as REXX or the Command Line Processor which comes with DB2 9 can provide the needed function. DB2 Estimator, available via Web download for DB2 V8, will not be provided for DB2 9 for z/OS.

DB2-managed stored procedure support is removed. Workload Manager (WLM) managed stored procedure address spaces is the strategic solution for stored procedure support. Simple table space creation support is removed. DB2 9 for z/OS no longer implicitly creates simple table spaces nor allows customers to create simple table spaces. However, DB2 9 for z/OS continues to support simple table spaces created in previous versions.

The Online help facility is replaced, replaced by the Information Management Software for z/OS Solutions Information Center (Information Center). JDBC/SQLJ Driver for OS/390 and z/OS support is removed. 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 DB2 Driver for JDBC and SQLJ (formerly known as the DB2 Universal JDBC Driver). Java stored procedures no longer run in resettable JVMs.

Plans and packages must be rebound on DB2 9 to benefit from optimizer enhancements. Plans & packages DB2 V3 & before, will be automatically rebound when accessed by DB2 9. See the Installation Guide section "Functions that are no longer supported" for more information and additional items. Temporary databases move to work files, authorization needs to be permitted on the work files.



## DB2 9 deprecated function

- Private protocol → DRDA (new help in DSNTDP2DP)
- Plans containing DBRMs → packages
- ACQUIRE(ALLOCATE) → ACQUIRE(USE)
- Simple table spaces → segmented or partitioned by growth
- XML Extender → XML type
- DB2 MQ XML user-defined functions and stored procedures → XML functions
- DB2 Management Clients feature (DB2 Administration Server, Control Center, & Development Center) → IBM Data Studio application & administration services
- msys for Setup DB2 Customization Center → install panels
- BookManager use for DB2 publications → Info Center, pdf

The above features are still included in DB2 9 and may be dropped from future versions. Note the direction indicated to the right of the arrows, as these are the functions provided to replace the existing function. If you are using any of these functions, you are advised to move to the new function.

See the Installation Guide section, “Functions that are deprecated” and the announcement material for more information on these changes.

[http://www.ibm.com/common/ssi/rep\\_ca/8/897/ENUS206-098/ENUS206-098.PDF](http://www.ibm.com/common/ssi/rep_ca/8/897/ENUS206-098/ENUS206-098.PDF)

## DB2 9 migration process changes, APARs



- Rebind required for V3 and earlier plans & packages
- Best process is rebind all in CM or NFM, top 10% in CM
  - Highly recommended to rebind all V8 and below
- PDSE is required for SDSNLOAD. PDSE service needed.
- Premigration job DSNTIJP9 APAR PK31841
- SPE PK11129, PK33664, PK39850,
- Info APARs: Install II12423, Unicode II13048 & II13049, DFSORT II14047, II14213 & II13495, DDF II14203, zIIP II14219, Performance II13579, Storage II10817, Parallel II12836, LOBs II13767, DSNUTILS sec. id. II13133, Coprocessor II13782, PDSE II14067, ...

Plans and packages must be rebound on DB2 9 to benefit from optimizer enhancements. DB2 V3 and earlier plans & packages will be automatically rebound when accessed by DB2 9. A much better process is to rebind all plans on the new version. If there is not adequate time to rebind in DB2 9 CM, see if you can rebind the most frequently accessed packages. If any plans have not been bound on V8, rebind them.

PDSE is documented as required on V8, but some customers noted that a PDS could be used (as long as the largest load module remained under 16MB). The PDSE is the only option for DB2 9, as there are program objects and larger load modules.

The premigration job DSNTIJPM on DB2 9 is shipped as DSNTIJP9 in APAR PK31841 for V8. Running this job on every subsystem helps find the work needed before migration. The SPE for DB2 9 is PK11129 and PK33664 on V8. Get all the service in this chain.

There are many useful information APARs. These are the ones I use the most. For secondary ids used with DSNUTILS, read II13133.

## DB2 9 default and process changes

- Changes to defaults
  - BIND ISOLATION defaults to CS
    - Not changed for distributed, REBIND
  - BIND CURRENTDATA defaults to NO
    - Not changed for REBIND
  - DB2-managed data set secondary extent allocation default YES, even for migration
  - Varying length data changes row format
  - Online REORG processes change
  - Configure shared virtual storage (128 GB for each DB2)

The default value for bind option CURRENTDATA changes from YES to NO for the BIND PLAN and the BIND PACKAGE subcommands, as well as the CREATE TRIGGER for trigger packages, and the CREATE PROCEDURE and the ALTER PROCEDURE ADD VERSION SQL statements for SQL PL procedure packages. CURRENTDATA NO is the best option for performance. The default value for bind option ISOLATION is changed from RR to CS for 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 distributed. Although you can specify DBPROTOCOL(PRIVATE) for the DBPROTOCOL parameter of the BIND option, DB2 issues a new warning. 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.

DB2-managed data set secondary extent allocation default setting is YES and is changed by installation CLIST from NO to YES. 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.

REORG and LOAD REPLACE utilities automatically convert table spaces to a new reordered row format (RRF) if there is no VALIDPROC or EDITPROC. If you use the REORG SHRLEVEL CHANGE utility, you might need to change your operating procedures if you run concurrent REORG TABLESPACE SHRLEVEL CHANGE PART x on the same table space. Configure 128 GB of shared virtual storage for each DB2 subsystem on the MVS image for memory shared between DB2 DDF and DBM1.

## DB2 9 Prerequisites: See Program Directories

- **Processor requirements:**
  - Processor that supports z/Architecture, including IBM System z9, zSeries z990, z890, z900, z800 or later
  - DB2 9 will generally require increased real storage for a workload compared to DB2 V8
- **Base Software Requirements:**
  - z/OS V1.7
    - DFSMS Version 1 Release 7
    - Language Environment Base Services
    - z/OS Version 1 Release 7 Security Server (RACF)
  - IRLM V2.2
  - z/OS Unicode Services & appropriate conversion definitions
  - DB2 Utilities Suite or equivalent function

These prerequisites apply whether you are migrating or installing. The best source for current information is the Program Directory. Be sure that the products are in support by checking on the web.

This is the first slide of several noting the primary prerequisites for DB2 9. The System z processors are required, with no changes from those needed by V8, although performance is better with the later processors. These are the base needs for DB2 9. The following slides note the optional and functional requirements.

IRLM V2.2 comes with DB2 9. Some of the basic operation of a DBMS is provided by utility functions, such as backup, recovery, reorganization, loading and unloading data, gathering statistics and checking data, indexes and large objects. You should ensure that these functions are provided either by ordering DB2 Utilities Suite for z/OS, Version 9, (5655-N97), or by obtaining equivalent function elsewhere.

## DB2 9 Prerequisites: Current software

- Migrate only from DB2 V8 NFM, expand BSDS
- DB2 9 for Linux, UNIX, Windows FP1 or V8.1 FP13 (V8.2 FP6 is the same as V8.1 FP13)
- DB2 9 Connect FP1 or V8.1 FP13
- IMS V10, V9, V8
- CICS V3.1, V2.3
- Enterprise COBOL V3.4, Move to V4 recommended
- Enterprise PL/I V3.4 Move to V3.7 recommended
- IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS, V4 or Performance Monitor, PK36297

These are the primary changes in levels for DB2 9 over those in DB2 V8. Current products are required, and some of the product levels needed by DB2 V8 are now out of service. The general rule is to stay within the service interval for all products if you want service.

The DB2 for LUW and DB2 Connect levels need fixpaks to function correctly. Fixpak 2 has just delivered, and some customers will need those fixes.

If you are not on current levels of COBOL, move to V3.4, as all others are out of service as of April 2007. If you are not on current levels of PL/I, move to V3.6, as all levels before V3.4 go out of service this year or earlier.

The Omegamon level needed is V4, with APAR PK36297 to support new function. The older V3, DB2 PM and DB2 PE products do not support DB2 9.

## DB2 9 Prerequisites: z/OS 1.8 for:

- RACF Access Control Module and roles
- RACF user-mapping plug-in Enterprise Identity Mapping
- Coprocessor with C or C++
- Volume-based BACKUP, RESTORE SYSTEM & RECOVER enhancements

- RACF SAF User-mapping plug-in Enterprise Identity Mapping (EIM) requires z/OS V1.8 with trusted context. See redbook SG24-6480-01 appendix C for more detail on EIM.

- For full RACF support of roles (not limited to ownership checks for roles only), RACF Access Control Module (DSNXRXAC) requires z/OS V1.8.

- The C and C++ compilers which come with z/OS 1.8 are required to use the DB2 coprocessor, instead of the precompiler for application development.

- See the next page for volume-based BACKUP and RESTORE.

## DB2 9 Requirements for Dependent Functions

- Volume based utilities require:
  - z/OS 1.8
  - DFSMSHsm 1.8
  - DFSMSdss 1.8
  - FlashCopy Version 2
- Group Bufferpool Batching:
  - CF level 15 or 14 recommended when using System Managed Duplexing for lock or SCA structures
    - CFLEVEL 15 structure sizes grow
  - CF level 13 recommended for castout and lock table cleanup enhancements
  - CF level 12 for improved V8 and 9 performance GBP batching

These are highlights only, not a complete list!  
See Program Directories.

z/OS V1.8, DFSMSHsm, DFSMSdss and FlashCopy V2 is required for DB2 9 function in System level Utilities: BACKUP SYSTEM, RESTORE SYSTEM, and RECOVER. z/OS V1.7, DFSMSHsm, DFSMSdss and FlashCopy V2 is needed for System level utilities: BACKUP SYSTEM and RESTORE SYSTEM (if you cannot currently satisfy one or more of the preceding program requirements you can use V8 DB2 functions in the BACKUP SYSTEM and RESTORE SYSTEM utilities).

z/OS V1.7, DFSMSdss (and FlashCopy V2 is highly recommended, although not technically required, for performance reasons) for Utilities: CHECK INDEX, CHECK DATA, and CHECK LOB.

Use the latest Coupling Facility (CF) level for the best performance.

CFLEVEL 15 is the current level and is needed for some of the z/OS 1.9 improvements, but it does cause growth in structure sizes. See WSC FLASH01572 for more.

CF level 14 is recommended when using System Managed Duplexing for lock or SCA structures. Coupling Facility (CF) level 13 is recommended for castout enhancement and lock table clean up enhancement. Coupling Facility (CF) level 12 is required for Group Bufferpool (GBP) Batching.

## DB2 9 Functional Software Requirements

- WebSphere Application Server for z/OS V6.1 for trusted context
- WebSphere MQ for z/OS V6.1
- z/OS XML System Services (z/OS XML) & SDK5
- Java SDK 1.4.2
- DB2 QMF components of DB2 9 for z/OS
- ... details in Program Directories on the web

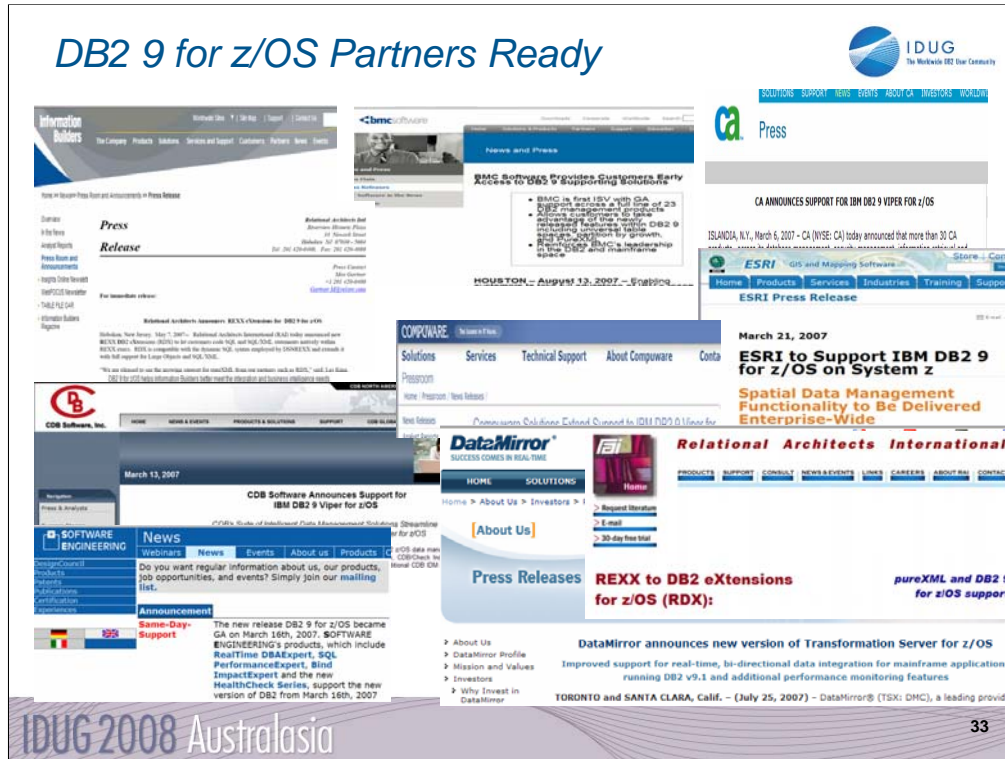
If you use WebSphere Application Server for z/OS, trusted contexts require V6.1.

IBM WebSphere MQ V5.3.1 or later is required for MQListener.

XML System Services (XMLSS). XMLSS requires either z/OS V1.8 or z/OS Version V1.7 with APAR OA16303. In addition, use of XML schemas requires 31-bit SDK for z/OS, Java 2 Technology Edition, Version 5 (5655-N98) (SDK5)

IBM SDK for z/OS, Java 2 Technology Edition, Version 1.4 (SDK1.4.2) is required for Application Execution: Applications or stored procedures written in Java, such as those using the JDBC or SQLJ interfaces to DB2.





Here are just a few of the DB2 partners that have announced that they are ready to run with DB2 9 for z/OS. These are images of the web pages from IBI, BMC, CA, ESRI, Compuware, CDB, Software Engineering, SoftBase, DataMirror and Relational Architects. Talk to your vendors about DB2 9.

Of course, if your tool vendor is IBM, you can check on the web for the precise release and PTF levels of the Information Management Tools releases and service needed to work with DB2 9 for z/OS. Note that the matrix lists some levels of tools with an X in the NS or not supported column. See the later version, with an X under T for toleration or under E for exploit or the ability to use those new improvements.

<http://www.ibm.com/support/docview.wss?rs=434&context=SSZJXP&dc=D600&uid=swg21256800>

## Old COBOL?

- ✓ Understand the options DB2 CICS V3
  - ➔ Compiler and Run-Time Migration Guide
  - ➔ No compiles OS/VS COBOL or VS COBOL II CICS V3 also
  - ➔ Run Old COBOL modules
- ✓ Set strategy & plan for Enterprise COBOL V4
  - ➔ Use V8 precompiler?, NEWFUN(NO)?
- ✓ Plan staging and Migrate

DB2 9 supports current Enterprise COBOL V3.4 and V4. Older compilers are no longer supported. OS/VS COBOL has been out of support since 1994. VS COBOL II support ended in 2001. Only LE runtime is supported. End of support for Enterprise COBOL V3.2 was October 2005, V3.3 in April 2007 so your target should be V4.

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/cobmvs.html>

The key resource is the COBOL Migration Guide, GC27-1409. Here is where to get it from the web:

<http://www.ibm.com/software/awdtools/cobol/zos/library/>

<http://publibfp.boulder.ibm.com/epubs/pdf/igy3mg10.pdf>

Key questions and guidance are in the first chapter. Most customers will stage migration. Do you have Enterprise COBOL V3.4 now? Is that the release developers use? Old load modules are not a problem. Precompiling is the challenge, so if new development and changes to old programs switch to the new compiler, then that is a possible migration strategy.

DB2 generates COBOL code that we expect to fail on the old compilers, although we have not tested. Programs that use the DB2 9 precompiler or coprocessor require current Enterprise COBOL V3.4 or V4.

[http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21166881&loc=en\\_US&cs=utf-8&lang=en](http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21166881&loc=en_US&cs=utf-8&lang=en)

## Old PL/I?

- ✓ Understand the options
  - ➔ Compiler and Run-Time Migration Guide
  - ➔ Run Old PL/I modules
- ✓ Set strategy & plan for Enterprise PL/I V3.7
  - ✓ Support requires at least V3.4 now
  - ➔ Use V8 precompiler?, NEWFUN(NO)?
- ✓ Plan staging and Migrate

DB2 for z/OS supports only current PL/I compilers. Every compiler prior to V3.4 is out of service in 2007, including OS PL/I V2.3, IBM PL/I for MVS™ & VM V1R1.1, V2, and V3R1 to R3.

<http://www.ibm.com/servers/eserver/zseries/zos/le/history/plimvs.html>

The Program Directory lists compilers you can use for **PL/I**:

The key resource is the Enterprise PL/I for z/OS Compiler and Run-Time Migration Guide *Version 3 Release 3*, GC27-1458-02. Get it from the web:

<http://www.ibm.com/software/awdtools/pli/plimvs/support/>

<http://publibfp.boulder.ibm.com/epubs/pdf/ibm3m101.pdf>

There are some basic choices to make. Key questions and guidance are in the first chapter. Most customers will stage migration to new compilers to improve programmer productivity and avoid migration costs. Do you have Enterprise PL/I V3.2 or V3.3 now? Is that the release developers use? Old load modules are not a problem. Precompiling is the challenge, so if new development and changes to old programs switch to the new compiler, this migration strategy improves costs and productivity.

[http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21191789&loc=en\\_US&cs=utf-8&lang=en](http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&q1=cobol&uid=swg21191789&loc=en_US&cs=utf-8&lang=en)

## DFSORT and DB2 for z/OS Utilities Suite and DB2 9

- V8 removed prerequisite for external sort product
- V8 only uses DFSORT: SORT, MERGE functions only
- Sort 32K page & improve reliability & performance
- DFSORT is part of standard z/OS install
- DB2 for z/OS Utilities Suite has license to use DFSORT when invoked by Utilities
- Must have access to DFSORT R14 plus APAR PQ68263 applied. See Info APARs II14047, II14213 & II13495
- DB2 9 requires APAR PQ92594
- Must update DB2 space statistics for sort space

The requirement for an external sort package has been removed. That is to say you do not need a DFSORT license for use by DB2 for z/OS Utilities Suite Version 8. The base DB2 for z/OS has never needed sort. If you use DFSORT for other purposes, then you do need a DFSORT license. You must update the DB2 space statistics to accurately reflect the data volumes in order for DFSORT to accurately allocate space. This support was delivered by [APAR PQ68263 \(PTF UQ90054\)](#) on RSU 0312. In fact, with the delivery of [APAR PK04076 \(UK03983\)](#), MSGDSNU1640I will be issued when the utility is unable to locate DFSORT code at APAR PQ68263 maintenance level. So DFSORT is mandatory and you have to use it for the utilities. However, there is good news. You already have DFSORT installed. You may not be using it, but it is there. DFSORT is always shipped and installed with z/OS. However, no license is required for the DB2 utilities to use DFSORT. The only action a customer must take is to add the DFSORT load libraries to link list after the OEM sort libraries or add a steplib/joblib to the DB2 utilities batch JCL. DB2 for z/OS Version 8 has a license to use DFSORT so the customer does not need a license for any external sort product. Again, MSGDSNU1640I will be issued when the utility is unable to locate DFSORT code. However, no non-DB2 task can use DFSORT without being licensed. Use of DFSORT other than by DB2 would require a license. Maintenance for DFSORT is shipped with z/OS. If a customer has problems with DB2's use of DFSORT, they would open an ETR with DB2 Level 2 Support no different that they would do today for any other DB2 related issue. The DB2 Version 8 requirement for DFSORT R14 or above is described in the following publications:

[URL for informational APAR II14047 describing DB2's use of DFSORT](#)

DB2 Version 8 Installation Guide (GC18-7418) ( All V8 manuals can be found at <http://www.ibm.com/software/data/db2/zos/v8books.html> )

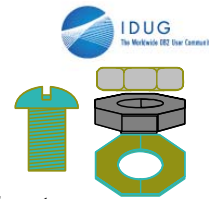
DB2 for z/OS Version 8: Everything You Wanted to Know... and More (SG24-6079)

([Download from IBM RedBook web site](#))

[DB2 v8 Program Directory](#)

<http://www.elink.ibmink.ibm.com/public/applications/publications/cgibin/pbi.cgi?CTY=US&FNC=SRX&PBL=GI10-8566-03#>

## Install Prerequisite Software



- **Functional Requirements for identified features and functions e.g. DB2 Connect, clients**

- ✓ See What's New in DB2?
- ✓ Program Directories for Details

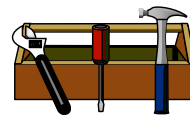
- **Service Level: IBM Consolidated Service Test**



- **Plan for more frequent service**

- ✓ More current releases = more frequent
- ✓ Refresh service level quarterly

- **Prepare to manage performance**



IBM and other vendor software must be checked for levels required and needed for the function you want. Some APARs require vendor changes. DB2 Connect: See next page and the web.

[ibm.com/software/data/db2/db2connect/](http://ibm.com/software/data/db2/db2connect/)

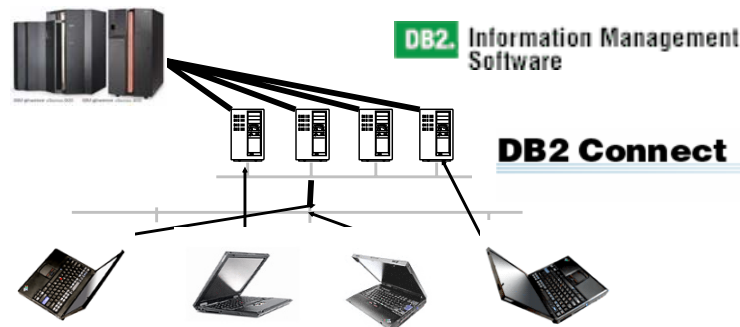
Use IBM Consolidated Service Test levels to help provide a well tested set of products at a recommended service level.

[ibm.com/servers/eserver/zseries/zos/servicetst/](http://ibm.com/servers/eserver/zseries/zos/servicetst/)

Customers who are relatively current on service encounter fewer problems overall. Refreshing the service level each quarter makes it easier to avoid encountering old problems.

## DB2 9 requires DB2 Connect 9 FP1 or V8.1 FP13

- ✓ Performance & Scalability
- ✓ Improved Application Availability
- ✓ Innovative manageability
- ✓ Programmer productivity



DB2 Connect V8.1 FP13 is the same as V8.2 FP6. If you are moving to DB2 9 for z/OS, then the minimum level is DB2 Connect 9 FP1 or DB2 V8 FP13. If you are not at the minimum levels, then it's time to migrate to the most current level you can. If you have the license, that would be DB2 9 fixpak 4 today. Otherwise that would be DB2 8 fixpak 16, also known as DB2 8.2 fixpak 9 at times. If you get current now, then migration to DB2 9 for z/OS will not encounter the same problem. So if a client is down level, then get it migrated to current.

If you have a specific set of problems, then you can check the fixpak levels to see where those problems are resolved. But then you still need to test to make sure that the problem is resolved without introducing any new ones. Later fixpaks generally resolve a lot more problems. If you are migrating, find a good one and move to that level. Running with code that is out of support or missing a few thousand fixes is problematical. DB2 Connect V7 is not supported, and generally does not work well. We don't generally separate CM from NFM on our discussions of fixpaks. Some new function can be used even in CM, and that includes using multirow operations for DRDA, for an example. See the web for fixpak information.

<http://www.ibm.com/support/docview.wss?rs=56&uid=swg27007053>

<http://www.ibm.com/support/docview.wss?rs=71&uid=swg21255572>

<http://www.ibm.com/support/docview.wss?rs=71&uid=swg21256235>

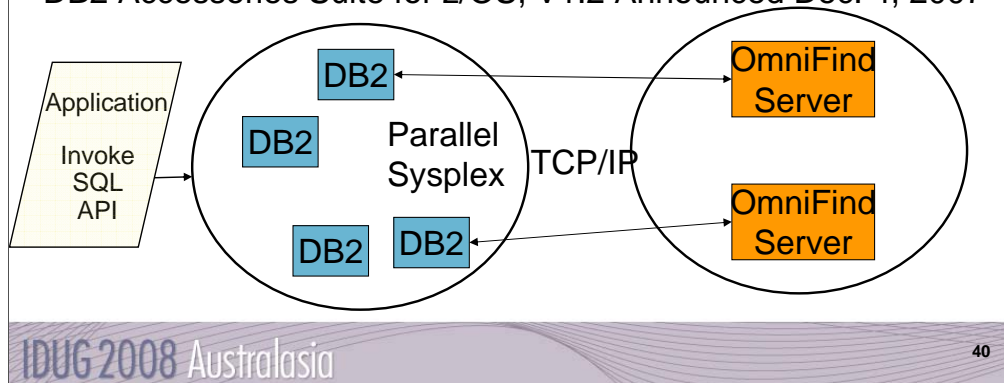


## OmniFind Text Search Support



- CONTAINS() built in function for text search
- Search CHAR, VARCHAR, LOB, & XML columns
- OmniFind provides a text index server
- Efficient communication interactions with DB2 for z/OS
- OmniFind text indexes are persisted into DB2 tables for backup/recovery purposes

DB2 Accessories Suite for z/OS, V1.2 Announced Dec. 4, 2007



IDUG 2008 Australasia

40

We have added a new built-in function, CONTAINS() to allow better text searching. This is the basic architecture of our solution. A specialized text search engine on a separate server is expected to come in DB2 9, but will deliver after general availability. While the server is separate, the text indexes are saved into DB2 tables to provide improved backup and recovery and consistency with DB2 data. See Peggy Zagelow's IOD session 1696 for the details.

For the announcement, see DB2 Accessories Suite for z/OS, V1.2, part of Announcement 207-319, dated December 4, 2007.

[http://www.ibm.com/common/ssi/rep\\_ca/9/897/ENUS207-319/ENUS207319.PDF](http://www.ibm.com/common/ssi/rep_ca/9/897/ENUS207-319/ENUS207319.PDF)



## Application Development & Administration Client

- API support
  - Java programming pureQuery
  - Open Source (PHP, Python, Ruby, etc.)
  - .NET, EGL, and other technologies
- SOA / Web Services / Web Access
  - Data Server Web Services
- AD tooling
  - .NET, DWB, RAD
- Administration tooling
  - Rational Data Architect (RDA)
  - IBM Data Servers Administration Console

The slide features several logos and images: IDUG (The Mainframe IZ User Community), PHP, Java, RAILS, Visual Studio.net, Python, perl, Eclipse, WebSphere, Rational (the software development company), and a screenshot of the IBM Data Servers Administration Console interface.

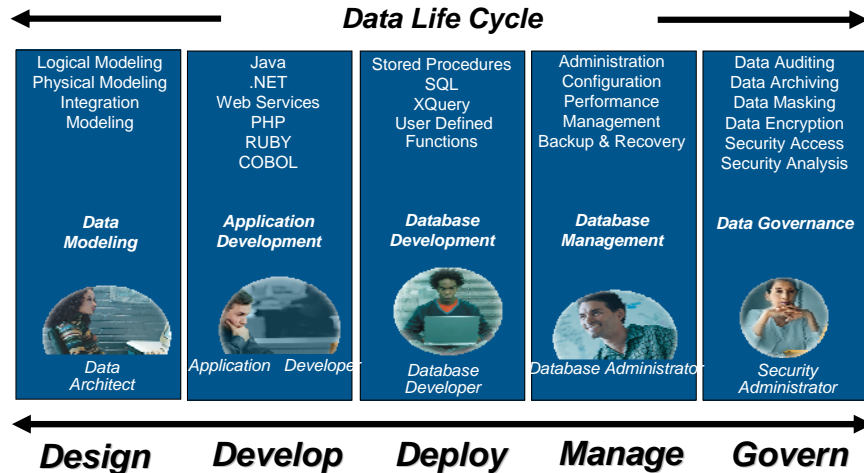
IDUG 2008 Australasia 41

This slide shows the scope and mission for IBM's Common Application Development and Administration organization. A wide range of administration and application development function delivers for IBM relational database: Informix Dynamic Server, DB2 for Linux, UNIX and Windows, DB2 Connect and DB2 for z/OS. The new IBM Data Servers organization is changing the face of IBM relational database as it provides the client for Informix and DB2 for Linux, UNIX, Windows, i5/OS and z/OS.

The new IBM Data Servers offering consolidates database administration and application development (APIs, developer tools) across IBM's relational databases. You will see names of some components changing to ones which include IBM Data Server, for instance IBM Data Server Administration Console and IBM Data Server Developer Workbench. Other Data Server deliveries include the Client, Runtime Client, and Drivers for ODBC, CLI, .NET, JDBC, SQLJ, Ruby, PHP, Perl, and Python. Application Development APIs strategy includes new support for PHP and Ruby on Rails, dramatic improvements in Java with JLinQ and keeping Microsoft support very current. The next generation of SOA web services comes from Data Server.

Recent improvements in application development tooling for both DB2 and Rational make the application life cycle more productive with better quality. The new Web-based administration console project provides a much improved, more productive way to administer IBM relational databases.

## Install IBM Data Studio: for many reasons

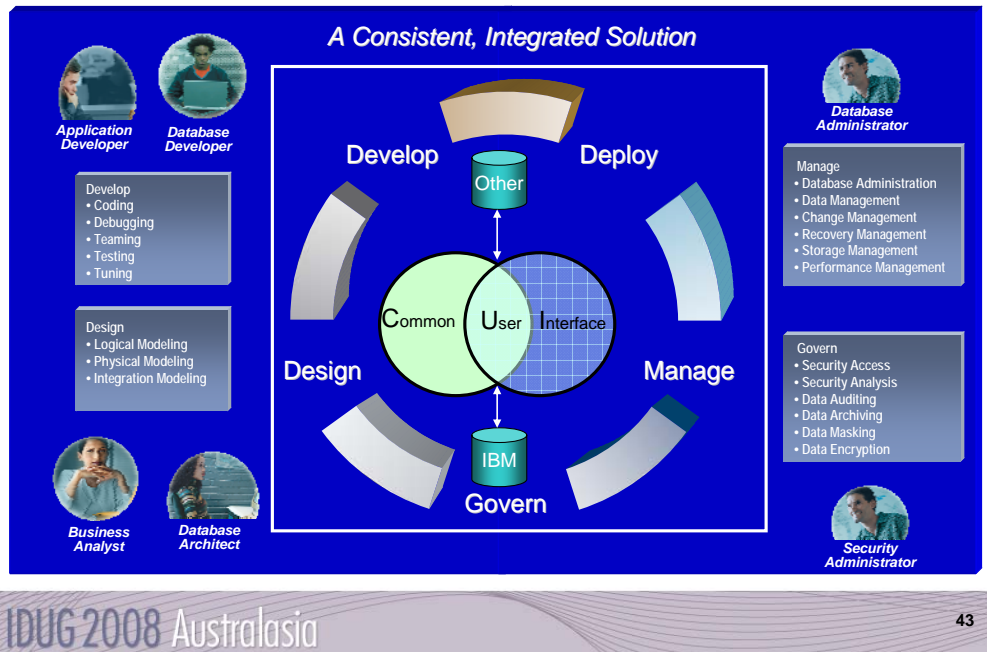


IBM Data Studio is for designers, developers, and administrators who work across the entire data life cycle and the entire IBM relational DBMS portfolio: DB2 for LUW, DB2 for z/OS, DB2 for i5/OS and IDS. Almost every customer will need the tools included with DB2, and many will need the additional ones. See the IBM Data Studio web page for all the changes in IBM Data Studio. Watch closely, as this area is changing fast.

<http://www.ibm.com/software/data/studio/>

[ftp://ftp.software.ibm.com/software/data/db2zos/IOD1298\\_ADadminTrendsDirections\\_CotnerOct2007.pdf](ftp://ftp.software.ibm.com/software/data/db2zos/IOD1298_ADadminTrendsDirections_CotnerOct2007.pdf)

# IBM Data Studio



Many of the facilities you use today are evolving into those of the IBM Data Studio. You can work with a graphical interface and work across platforms. The design is also integrated across the information life cycle.

## IBM Data Studio v1.1



- Empowering developers and database administrators
- Complimentary and available in October of 2007
- Support for DB2 on all platforms and IDS

DB2 for LUW	DB2 for z/OS	DB2 for i5/OS	IDS
<ul style="list-style-type: none"> <li>• Physical Data Modeling</li> <li>• Data Distribution Viewer</li> <li>• Integrated Query Editor</li> <li>• SQL Builder</li> <li>• SQL Routine Debugger</li> <li>• Java Routine Debugger</li> <li>• XML Editor</li> <li>• XML Schema Editor</li> <li>• pureQuery for Java</li> <li>• Data Web Services</li> <li>• Object Management</li> <li>• Data Management</li> <li>• Update Statistics</li> <li>• Health Monitoring *</li> <li>• Visual Explain</li> <li>• Security Access Controls</li> <li>• Project Management</li> </ul> <p>* Technical Preview</p>	<ul style="list-style-type: none"> <li>• Physical Data Modeling</li> <li>• Data Distribution Viewer</li> <li>• Integrated Query Editor</li> <li>• SQL Builder</li> <li>• SQL Routine Debugger</li> <li>• Java Routine Debugger</li> <li>• XML Editor</li> <li>• XML Schema Editor</li> <li>• pureQuery for Java</li> <li>• Data Web Services</li> <li>• Object Management</li> <li>• Data Management</li> <li>• Update Statistics</li> <li>• Visual Explain</li> <li>• Security Access Controls</li> <li>• Project Management</li> </ul>	<ul style="list-style-type: none"> <li>• Physical Data Modeling</li> <li>• Data Distribution Viewer</li> <li>• Integrated Query Editor</li> <li>• SQL Builder</li> <li>• SQL Routine Debugger</li> <li>• Java Routine Debugger</li> <li>• XML Editor</li> <li>• XML Schema Editor</li> <li>• pureQuery for Java</li> <li>• Data Web Services</li> <li>• Object Management</li> <li>• Data Management</li> <li>• Security Access Controls</li> <li>• Project Management</li> </ul>	<ul style="list-style-type: none"> <li>• Physical Data Modeling</li> <li>• Data Distribution Viewer</li> <li>• Integrated Query Editor</li> <li>• SQL Builder</li> <li>• XML Editor</li> <li>• XML Schema Editor</li> <li>• pureQuery for Java</li> <li>• Data Web Services</li> <li>• Object Management</li> <li>• Data Management</li> <li>• Security Access Controls</li> <li>• Project Management</li> </ul>

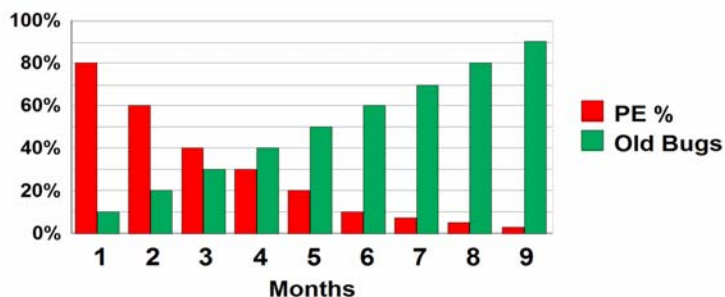
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<http://www.ibm.com/software/data/studio/>

[ftp://ftp.software.ibm.com/software/data/db2zos/IOD1298\\_ADadminTrendsDirections\\_CotnerOct2007.pdf](ftp://ftp.software.ibm.com/software/data/db2zos/IOD1298_ADadminTrendsDirections_CotnerOct2007.pdf)

## How current should we be?

- Stay reasonably current with DB2 releases & fixes
- Balance for severities. Use Consolidated Service Test.
  - ▶ Potential PTF in Error or PE: Enhanced HoldData
  - ▶ Problems encountered instead of avoided
  - ▶ Business constraints and work load



Choosing service timing requires judgement, not simple rules. The best practice for service means an understanding of your business drivers and constraints. These scales are not the same. Timing for moving preventive service into production is a careful balance between potential problems caused by PTFs containing an error (PEs) & potential problems avoided by applying the maintenance sooner. About 70% of PEs are found within four months after the PTF is closed. Currently, about 6 PEs are found every month across all versions. Green bars reflect the percentage of PEs yet to be found. Systems programming work load & availability of windows for installing service can affect timing.

I recommend upgrading service levels two or three times a year. Use current CST recommended service level, all service plus a two to four month later level for hipers & PE fixes. Stage that level through development systems & production. Match your levels with CST, across operating system & key subsystems. Enhanced HoldData provides a much faster way to discover missing hipers and PEs without fixes.

<http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>

<http://service.boulder.ibm.com/390holddata/390holddata.html>

## Service Best Practice

Use Consolidated Service Test  
Recommended Service  
Cross product tested levels  
Best practice for service:  
two or three per year

<http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>

**Consolidated Service Test and the RSU**

**The Consolidated Service Test Mission**

Our mission is to provide a consolidated, tested, and recommended set of service for z/OS and key subsystems on a quarterly basis with published results. This means that when you order your current service deliverable (ShopSeries) you'll receive and install one recommended service package with a tested level of service for all these products.

**How we do our testing**

We test in a customer-like production sysplex environment in an IBM test lab and are continuously improving our CST test environment. We run batch and data-sharing applications that exploit and stress the latest functions with up to two levels of subsystems on three levels of z/OS systems. As we test, we observe how each product runs and how they interact in this environment. We report problems to the IBM Support Center. We have the following FHIRs installed on our systems. For more information about our environment, see our [CST Quarterly Report](#).

We have a quarterly CST test cycle:



Consolidated Service Test provides a way to leverage more IBM testing and experience from many customers across a much broader set of products, including z/OS, IMS, CICS, DB2, WebSphere and many tools. This technique is working for very large, very small and in between customers. If you don't have an extensive test suite - like most customers, then this technique can help a lot in reducing research and finding a stable service level.

Effective June 15, 2007, the DB2 for z/OS Version 8 SUP tape is available world-wide for new customer orders. This SUP tape was built differently than prior SUPs, such that its build in May integrated PTFs COR-closed through December 2006, which had also completed a Consolidated Service Test (CST) cycle. Once PTFs complete a CST cycle, they are assigned a Recommended Service Upgrade (RSU) status. Our DB2 for z/OS Version 8 SUP tape contains CST tested PTFs which were marked "RSU 0703" (they completed CST testing in March 2007). This SUP build integrated a total of 964 PTFs (the delta since our December 2005 SUP), which is nearly 1,000 fewer PTFs our new customers need to deal with during their DB2 V8 installation experience. For additional information on CST and RSU, please see: <http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>

Installing two or three CST levels a year means more current service, but not too current. If you want a process that has proven track record for success and can reduce your work, then look at the CST. Use current CST recommended service level: all service plus a two to four month later level for hipers & PE fixes. Stage that level through development systems & production. Match your levels with CST, across operating system & key subsystems. Enhanced HoldData provides a much faster way to discover missing hipers and PEs without fixes.

## Premigration Activity ... *Manage Performance*



### **Prepare to manage performance**

- **Save accounting reports**
- **Save critical access paths**
  - ▶ **Be sure you have PLAN\_TABLE access paths & DSN\_STATEMNT\_TABLE & DSN\_FUNCTION\_TABLE for critical applications (or Visual Explain reports).**
  - ▶ **Run EXPLAIN on queries before migrating.**
  - ▶ **Add new columns to PLAN\_TABLE**
- **Differentiate by plans & packages**

Save critical access paths & accounting data! Changes can cause unwanted access path changes. Identify important queries, plans & packages. Be sure plan tables contain access paths & costs. ALTER current plan tables to add new columns. EXPLAIN REBIND may change access paths, so extract plans & run EXPLAIN under a dummy collection, a different application or program name.

Keep accounting reports for crucial queries & applications. If you have a problem & send in long accounting reports & explain data, we find the issue quickly. If you don't have data, then we guess.

Monitoring & managing are more difficult with few plans. Never ending threads & plan reuse accumulate EDMPOOL & working storage. Each COMMIT needs package accounting. Recycle threads. Finding unused packages & 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. Best practice is to differentiate by plan within a CICS region, having at least 5 to 20 plans within a region. You can work faster & make changes on a more granular basis.

## Practice Three Rs of DB2

- **REORG**
  - ▶ Real time statistics
  - ▶ Performance, space
- **RUNSTATS**
  - ▶ After significant change
- **REBIND**
- **Recheck**
  - ▶ Explain and run time performance
  - ▶ **MODIFY, COPY**



This practice starts with the basics, but performing the three Rs effectively can avoid a wide range of problems. In other cases, they are the steps needed to resolve a problem. These steps are needed to keep clustering effective, maintain free space, avoid index splits, keep sequential prefetch performance high, ... Using real time statistics to drive the process is being used more and more.

After the REORG is completed or during the process, gather the updated statistics. Balance the cost of gathering the information with the improved information for optimization. Improved statistics can mean improved access paths – ones that were not available before.

Using the improved information means using dynamic SQL or rebinding. After the rebind, checking the explains and the run time performance for regression can avoid problems. Do you want to rebind only in NFM or do you rebind some packages in CM too. How long will you be in CM? The longer the period, the more you will want or need to rebind in CM.



## To REBIND or not to REBIND

- **WHEN? is the question**
  - ▶ When to take the chance of access path regression
  - ▶ For the potential benefits of improved performance & memory
- **When migrating? Test Before**
  - ▶ Parallel individual binds
  - ▶ More disruptive, longer
- **Incrementally or later**
  - ▶ More potential for problem calls
  - ▶ Resolution could be more difficult



To rebind or not to rebind, "When?" is the question: Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous access paths, Or to take arms against a sea of troubles, And by rebinding, end them? To die: to sleep; No more; and by a sleep to say we end the heart-ache and the thousand natural shocks that old plans are heir to. 'tis a consummation devoutly to be wished To die, to sleep. To sleep: perchance to dream: ay, there's the rub; For in that sleep of death what dreams may come when plans have shuffled off this mortal coil, must give us pause: There's the respect that makes calamity of so long life for old plans and packages; [Apologies to the Bard and to Hamlet 3.1.]

The question is not whether to REBIND, but rather when to REBIND. Planned rebinds avoid surprises. A fix may need to rebind everything. Performance gains in a new version often occur at REBIND. When you rebind, performance is

1. Same: Most common case is plus or minus 5%, which is usually ignored
2. Worse: Least common, but usual regression causes are new access path or increased parallelism. If you compare to the prior access plan, then you can find most problems easily. If you wait until a BIND occurs, analysis is more difficult; you are less likely to have all of the performance & plan data. Use a tool or compare access paths to find problems.
3. Better: Many of the V8 performance improvements only occur if you bind. Some SQL is likely to benefit from optimization improvements, such as index use, joins, subquery transformations or UNION improvements. When you find a problem - errors or performance - the fix is often to REBIND. Best practice for migration is to test binds before migration & bind at migration time (comparing before and after). Use a tool for comparison and the task is simpler, but simple comparisons of cost estimates catch most problems.

## Plan to REBIND packages



**Old plans and packages have more to gain, less to lose  
BIND changes coming for plan stability, to eliminate  
private protocol and DBRMs bound into plans**

**CM – how long? Very little new value**

- ▶ Most optimizations included
- ▶ Rebind key packages at least

**New function mode**


- ▶ Adjust database design, applications
  - ▶ Improved index options: compression, larger page sizes, on expression, New SQL
  - ▶ Native SQL procedures, more zIIP
  - ▶ Rebind after changes
- ▶ Rebind all plans and packages (may stage)



Best practice for migration is to test binds before migration & bind at migration time (comparing before and after). Use a tool for comparison and the task is simpler, but simple comparisons of access path differences catch most problems. There are a number of good tools on the market. For the best chance of improvements with the lowest risk of regression, rebind the oldest plans and packages. If there was a problem that resulted in a plan or package error, then the only way to resolve the issue is to rebind (or free and bind). Use a dummy collection for the test bind and save the old package to revert back if needed. Since most of the improvements in optimization are already functional in CM, most customers bind the key packages and plans during compat mode. If CM is a very short period, or you do not need the improvements, then you might wait for new function mode to rebind. If you stay in CM for a long time, then you will want to rebind more of the packages and plans.

In new function mode, all of the optimization improvements can be made. Often you will want to look at performance challenges for your customer and see how they can be resolved. such as compression, index on expression and larger pages. After making the design changes, REORG the data and REORG or REBUILD the indexes, get the improved statistics and REBIND. Native SQL procedures, added use of zIIP, and improved SQL continue the improvements in this phase.

<http://www.ibm.com/support/docview.wss?rs=64&context=SSEPEK&dc=DB520&uid=swg21078662>



## Optimization

Addressing	Solution
<p>SQL – static or dynamic - performance regression for new BIND or REBIND Who? Administrators, performance Impacts: CPU, elapsed time, productivity Substantial impact when access path is bad</p>	<p>Aspects of success: Large reduction in regression If regression occurs, easy switch to old access paths Reduce, almost eliminate effort Save CPU, IO, elapsed time</p> <p>Less fear of BIND, REBIND Allow optimizations to be more aggressive, automation, parallelism, Easier migrations to new versions, ...</p>

IDUG 2008 Australasia 51

Unexpected changes in access paths lead to performance regressions

Regressions typically seen during migration to a new release

Also seen during the lifetime of a release after maintenance fixes are applied

changes in data and/or schema: growth, need for REORG, getting current statistics, ...

changes in the applications require REBIND or BIND REPLACE

Both Static and Dynamic SQL affected

Static SQL regressions seen after BINDs and REBINDs

Dynamic SQL even more exposed

## Changes to REBIND & BIND

- Improve access path stability:
  - PLANMGMT
  - SWITCH
- Help convert plans with DBRMs to packages:
  - COLLID
- Help eliminate private protocol:
  - DISTRIBUTE, DISTRIBUTEADD

Several changes are coming in BIND and REBIND for DB2 9. The first one has been delivered, with the ability to retain old access paths.

## BIND Stability in DB2 9 PK52523

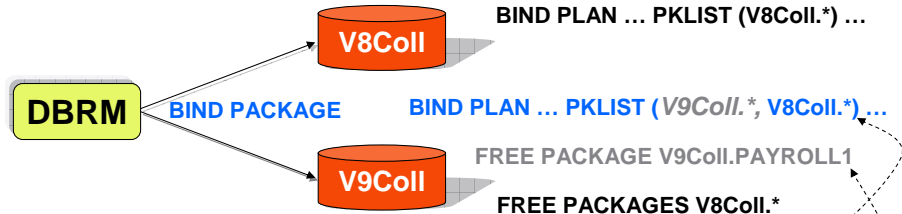


- At REBIND, save old copies of packages
  - Catalog tables
  - Directory (SPT01 table space)
- Two flavors
  - BASIC and EXTENDED
  - REBIND options
  - Default new DSNZPARM
- REBIND PACKAGE ...
  - PLANMGMT (BASIC) 2 copies: Current & Previous
  - PLANMGMT (EXTENDED) 3: Current, Previous, & Original
- Most bind options can be changed at REBIND.
- REBIND PACKAGE ...
  - SWITCH(PREVIOUS) Switch between current & previous
  - SWITCH(ORIGINAL) Switch between current & original
- FREE PACKAGE ...
  - SCOPE(ALL) – Free package completely
  - SCOPE(INACTIVE) – Free old copies
- Invalidation and Auto Bind
  - Each copy invalidated separately
- Cost of stability
  - No impact on statement runtime processing
  - 2-3 times increase in SPT01 table space
  - 30% CPU overhead for REBIND

1. PK52523 has the main function. PK52522 is the pre-conditioning APAR. Both of these have PTFs now. The DB2 books and the online Information Center document this functionality so customers can already read about it online.
2. The old copies are primarily saved in the SPT01 tablespace and it will grow in size. For BASIC, the overhead is 2x. For extended, it is 3x.
3. We have a few solutions to mitigate this disk space increase:
  - (a) Users could use FREE PACKAGE ... PLANMGMTSCOPE to selectively free old copies of packages that they think are stable
  - (b) In DB2 X, we expect to implement an 'access path comparison' function that will not save an old copy if it's the same as the new copy.

**Plan Stability – Using a dummy collection**

- REBIND packages into a new collection ID



- BIND PLAN with new collection ID added
- Free regressed packages from the new collection
- Free packages from the old collection when new packages demonstrate expected performance

This part is a technique that can be used today with a dummy collection used to REBIND packages for comparisons.

## BIND Stability – APAR PK52523

- Old access paths retained at REBIND  
REBIND PACKAGE (HRCOLL.SALPKG)  
PLANMGMT(BASIC | EXTENDED)
  - BASIC retains 2 copies: Current and Previous
  - EXTENDED retains 3 copies: Current, Previous, Original
  - PLANMGMT is also a new subsystem parameter
    - Can be used in place of command options
- Fallback to an older access path  
REBIND PACKAGE (HRCOLL.SALPKG)  
SWITCH(PREVIOUS | ORIGINAL)
  - Conceptually, this can do a “ROLLBACK” of a prior REBIND

These APARs (PK52522 for preconditioning and PK52523) support the following function:

1. A new REBIND PACKAGE option called PLANMGMT that can be used to control whether REBIND PACKAGE saves old package copies. This option has three possible settings - OFF, BASIC and EXTENDED.

PLANMGMT(OFF) - No change to existing behavior. A package continues to have one active copy

PLANMGMT(BASIC) - A package has one active copy, and one additional old copy (PREVIOUS) is preserved.

PLANMGMT(EXTENDED) - A package has one active copy, and two additional old copies (PREVIOUS and ORIGINAL) are preserved.

Preserving old copies has no impact on query performance. However, using the PLANMGMT(BASIC) option can double the disk consumption in table space SPT01, and using the PLANMGMT(EXTENDED) option can triple it. The extra space is needed to maintain old copies. In addition, using the BASIC or EXTENDED option adds a 10-40% CPU overhead to the performance of the REBIND PACKAGE command.

2. A new system parameter called PLANMGMT for specifying the default setting of PLANMGMT option of REBIND PACKAGE. Possible settings are: OFF, BASIC and EXTENDED. The default value of this parameter is OFF. To use a setting other than OFF, update your DB2 9 subsystem parameter (DSNZPxxx) modules, then either use the SET SYSPARM command or stop and start DB2 for the change to take effect.

3. A new REBIND PACKAGE option called SWITCH to allow users to revert a package to an older copy, effectively undoing a prior REBIND invocation.

SWITCH(PREVIOUS) - The PREVIOUS copy is activated

SWITCH(ORIGINAL) - The ORIGINAL copy is activated

4. A new FREE PACKAGE option called PLANMGMTSCOPE to allow users to free older copies that are no longer necessary.

PLANMGMTSCOPE(ALL) - Free the entire package including all copies. This is the default.

PLANMGMTSCOPE(INACTIVE) - Free all old copies

## BIND changes to eliminate plans with DBRMs



- New REBIND plan option: COLLID(collection\_id | \*) for DBRM to Package conversion REBIND PLAN(X) COLLID(\*)
- REBIND PLAN(x) COLLID(collection\_id) convert DBRMs bound with plan x into packages
- REBIND PLAN (X1, X2, X3) COLLID (collection\_id | \*) REBIND multiple plans which may contain DBRMs
- REBIND PLAN (\*) COLLID (collection\_id | \*) all plans in SYSIBM.SYSPLAN
- REBIND PLAN (x) COLLID (collection\_id | \*) PKLIST(Z) plan with both DBRMs & package list, DBRMs converted to packages, new entries in package list
- REBIND PLAN (x) COLLID (collection\_id | \*) NOPKLIST
  1. Plan x has no DBRMs, existing pklst deleted.
  2. Plan x has only DBRMs, DBRMs converted to packages
  3. Plan x has both DBRMs and PKLIST, existing pklst deleted, new pklst converted from DBRMs bound into plan x

### DJ435 BIND changes for eliminating acquire(allocate), plans with DBRMs

- New Rebind plan option: COLLID(collection\_id|\*): Trigger DBRM to Package conversion by specifying collection ID for the packages, which are converted from DBRMs.
- REBIND PLAN(X) COLLID(\*). "\*" is the default value as: DSN\_DEFAULT\_COLLID\_X (X is the plan name) This command will allow customer to convert DBRMs bound with plan X into packages under collection ID: DSN\_DEFAULT\_COLLID\_X automatically.
- REBIND PLAN(x) COLLID(collection\_id): CollID option is used if user intends to convert DBRMs bound with plan x into packages. As shown in this example: users can specify collection id as y for the new packages converted from DBRMs. If there are both DBRMs and package list in plan x, newly converted package entries will be inserted into the front of the existing packagelist. Same behavior applies to \*, but using DSN\_DEFAULT\_COLLID\_X instead of letting user specify.
- REBIND PLAN (X1, X2, X3) COLLID (collection\_id|\*) Rebind multiple plans which may contain DBRMs. Bind all Plans specified here in SYSPLAN table, and do conversion, until no plans specified here have DBRMs bound within.
- REBIND PLAN (\*) COLLID (collection\_id|\*) All plans in SYSIBM.SYSPLAN table.
- REBIND PLAN (x) COLLID (collection\_id|\*) PKLIST(Z) In this case: If plan has been bound with both DBRMs and package list, the DBRMs will be converted into packages, and the new entries will be inserted into the front of the existing package list.
- REBIND PLAN (x) COLLID (collection\_id|\*) NOPKLIST. Three cases :
  - 1. Plan x does not have DBRMs, then the existing pklst will be deleted. No other change required.
  - 2. Plan x only has DBRMs, DBRMs will be converted into packages accordingly, and NOPKLIST will be ignored.
  - 3. Plan x has both DBRMs and PKLIST, the existing pklst will be deleted, while the new pklst converted from the DBRMS will be bound into plan x.



## How much room will you get in DBM1?

It depends.

Estimate 10% to 15%

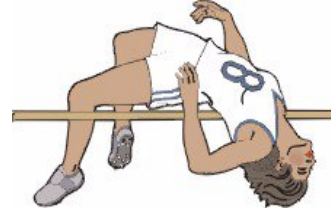
5 EDM pools

REBIND needed for savings

DDF - shared memory

Above the bar shared virtual storage required

You need to calculate, monitor and manage



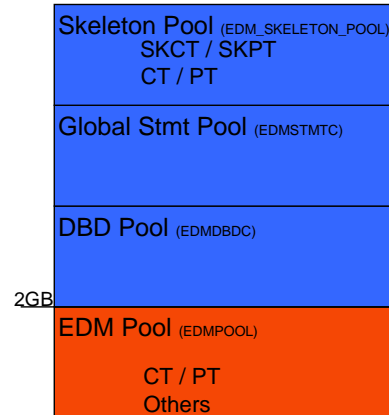
You still need to do the calculations, monitor and manage storage. DB2 9 improvements are generally about 10% to 15% more storage moved out from below the bar, with two more parts of the EDMPOOL, some of dynamic statement cache, and use of 64 bit storage for the DDF address space, with some above-the-bar storage shared with the DBM1 address space. You need to configure the 128 GB virtual shared area above the 2 GB bar. EDM virtual storage savings only occur if you rebind packages. Note that plans containing DBRMs are deprecated. Watch for some improvements in migration techniques for plans containing DBRMs.

## DB2 9 64 bit Evolution (Virtual Storage Relief)



Virtual Storage Constraint is still an important issue for many DB2 customers. The following changes provide some relief:

- EDMPOOL Changes:
  - V8 – DBD storage moved above 2GB bar.
  - DB2 9 – SKCT, SKPT, some CT, PT storage moved above 2 GB bar.
  - DB2 9 approx. 60% reduction in EDMPOOL size observed for lab workloads
- Other changes:
  - Some storage acquired for distributed applications moved above 2GB bar.
  - Control blocks for pagesets and RTS move above the bar.
  - DSC statement text moved above the bar
    - SAP tests have shown almost 300 MB reduction in virtual storage below 2 GB bar



IFCID 217: detailed DBM1 virtual storage health

IFCID 225: consolidated DBM1 virtual storage health

Objective was 10-15% relief. EDMPOOL – you can estimate DB2 9 EDM pool size from V8 stats as follows:  $(\#pgs \text{ for SKCT/SKPT}) * 0 + (\#pgs \text{ PT/CT}) * 70\%$ . Rough ROT is V8 EDM pool size can be reduced by 60%. Extensive use of SQL SPs can drive up EDM pool usage since these pkgs are larger. General recommendation, keep this the same in DB2 9. EDM\_SKELETON\_POOL – added in DB2 9.

For SAP SD transaction with 360 user threads, the total DBM1 virtual storage below 2GB was 1091MB in V8 and 819MB in DB2 9 for almost 300MB reduction. Most of that comes from local dynamic statement cache storage going down from 466MB to 172MB. Net of 1% real storage increase overall. For TPCE for example, 532 pages below 2GB were used for PT in V8. In DB2 9, 763 pages are used below 2GB and 316 pages are used above 2GB. So there is an increase in below 2GB virtual storage usage for PT in DB2 9. 1268 pages used for SKPT in V8 are all moved above 2GB in DB2 9 with a total of 1329 pages. EDM pool pages used below 2GB therefore dropped from 532+1268 to 763, or 58%.

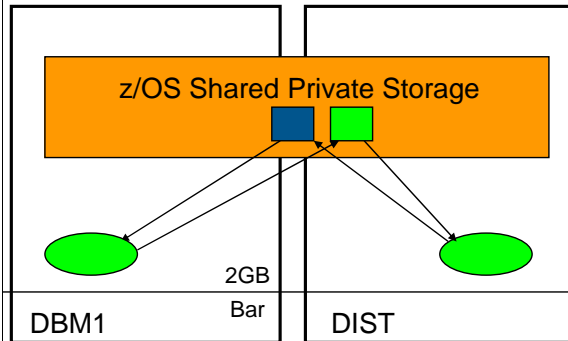
EDM LRU latch contention relief (LC24). Previously one LRU chain in EDM pool with only one corresponding latch. Now split into three pools each with 3 latches: 1) SKCT/SKPT above 2GB 2) CT/PT above 2GB 3) CT/PT below 2GB

DBM1, the following are moved above the bar in DB2 9

- Parse trees peak below-the-bar storage for full prepare reduced 10%
- EDM fixed pools: V8 customer dumps show as much as 50m will be moved. Allows larger above the bar EDM pools
- SKPTs / SKCTs (primarily static SQL). Also part of the CTs/PTs; New EDM pool for skeletons; Savings in below the bar 10m to 300m
- Page set blocks, RTS blocks: up to 10's of MB savings
- Local SQL statement cache: rough ROT: about 60% moves above bar
- Thread-related storage: Certain Run Time Structures, space block DMTR 10's of MB or more in savings
- Average V8 customer may see another 200 MB of relief: RID Pool, Sort Pool, compression dictionaries, castout buffers and others already above the bar (V8).

## 64-bit DDF – Shared Private with DBM1

- DDF address space runs in 64-bit addressing mode
  - Shared 64-bit memory object avoids cross memory moves between DBM1 and DDF and improves performance



- Shared memory: new virtual storage type allowing multiple address spaces to share storage.
- Similar to ECSA – always addressable, avoids AR and XM moves.
- Different from ECSA – only available to those address spaces registering with z/OS to share this storage.
- Reduces data formatting and data movement
- Reduces virtual storage
  - It exists once, instead of in each address space

Skeletons above the bar: For customers that use heavy package and plan activity such as banks, this is the most significant DBM1 below the bar storage relief in DB2 9. For customers that use very few or small packages, such as SAP environments, the savings is smaller.

LI702 – move spaceblk (SPA) above the bar. SPA to be split into 2, 1 above, 1 below. Only a few, non-complex RTs are being considered for DB2 9. Simple insert, delete  
 Expected results will vary by SQL mix. (-5 to 30%)?

Has storage key & fetch protection

Defaults to 2TB size

DB2 requires a minimum of 128GB configured or DB2 9 will not run

Even if not running DIST  
 Set by HVSHARE in Parmlib

## General guidelines DB2 9 storage

- Method for estimating DBM1 virtual storage savings in DB2 9 vs. V8
- Information is in IFCID 225
- STMT cache blocks: 100% moves above 2 GB
  - Varied **10-44 MB** in the V8 dumps we examined. Can be up to 100 MB or more.
- SQL statement cache: approx. 60% moves above 2 GB
  - Statement above bar (split).
- EDM SKCT/SKPT – 100% moves above 2 GB
  - Primarily static applications, this can be **100-200 MB if rebind done**
- Other misc. data areas also move above

STMT CACHE BLOCKS storage in V8 GA is huge storage. PQ96772 after V8 GA moved most of this storage above. DB2 9 moved the SQL statement text, which can be fairly moderate sized storage if the EDM statement pool is really large.

Before the SAP POK test we were looking at 15-20% savings in the SQL STATEMENT CACHE storage through local tests. The SAP POK test showed up to 90% savings in this storage. It turns out that SAP apparently uses DESCRIBE to collect information that is stored in the SPACEBLK. Some of this storage can be very large if there are a lot of columns (select list or insert). This surprise was needed or many SAP scenarios would show very little storage improvement in DB2 9.

## Migration - data sharing group

- ▶ V8 and DB2 9 CM members within group for a short time (coexistence)
- ▶ **MUST** apply fallback SPE to all members first
- ▶ First member migrated must be successful before migrating other members
  - Run CATMAINT only for the first member
- ▶ Use Data Sharing book for migration
- ▶ Migrate all members before using new function
- ▶ Restrict execution of packages & plans bound on new version to migrated members
- ▶ Group quiesce in DB2 9 NFM for locking protocol 3 (LOBs)
- ▶ CFLEVEL 15, 14, 13, 12 for best performance



Remember to work with new V8 function only on a group that has migrated to V8 NFM. Therefore, it is best to migrate all of your members and test with existing applications before implementing any new features or functions.

If you have multiple releases in a group for more than a week, then you need to have much better controls in place and be able to test your processes more thoroughly.

Persistent structure size changes, group attach improvements, restart light and enhanced constraint management are more complex if multiple releases are involved.

The minimum CFLEVEL is to have a level that is in service. Most data sharing customers will want to be at CFLEVEL 14, 13 or 12. There is quite a bit of information about CFLEVEL on the web:

<http://www.ibm.com/servers/eserver/zseries/psocftable.html>

Get the detailed steps from the Installation Guide & Data Sharing: Planning & Administration.



## Customer Experiences

- **Customer experiences say pay attention to:**
  - **Read the web, books, Info APARs, PSP**
  - **Have a plan that includes performance**
  - **Run premigration job DSNTIJPM**
    - **Use V8 DSNTIJP9 job**
    - **On every subsystem**
  - **Current maintenance for DB2, z/OS & CF**
  - **Get the latest books: library, red books, ...**



Most of these were mentioned before. They are mentioned again because other customers missed them. Many customer problems dealt with items on the foil titled Premigration Action. Run the premigration job. Check CATMAINT messages.

Programmers must add colons for all host variables. Make sure DBAs understand the new authorizations and meaning of schema names. Check for release dependent objects on fallback or coexistence.

Having current service & books saves time & avoids problems.

Check other early customer experiences here and later.

<ftp://ftp.software.ibm.com/software/data/db2zos/A01jc.pdf>

RTFW


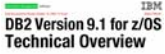


RTFW is the acronym for Read the Friendly Web. Let's take a short walk on the wild, wild web. The problem with the web is not too little information, but rather too much information. The experience is a bit like trying to take a drink from a fire hose. So I'd like to help a bit by narrowing the search with the twenty five cent tour of a few of my favorite DB2 web sites. A lot more information has been added in the past month or two, with many new books and web pages.

Let's start with the DB2 family. I'll generally show the short form or alias of the URL, omitting `http://`

Here are some tips for avoiding the 404. You don't need `www` in front of `ibm.com` in most situations. There is often something after `www`, such as the `-306` in `www-306` when you get the URL back from the browser. Remove the hyphen and number when you save the URL, since that number changes more quickly than the rest of the URL.

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- ✓ Utility Guide and Reference
- ✓ Internationalization Guide (Unicode)

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For installation, you need many books. Some are optional, for example the data sharing book is not needed if you don't use data sharing. If you use data sharing, then part of the install process is in that book. Part of the Java install process is in the Java book. Part of the ODBC install process is in the ODBC book. If you use RACF access control, then you need the RACF Access Control Module Guide. You can get most of the books from the DB2 Library web page. The books were updated in December 2007 and February 2008, with some later, so get the latest ones. Some of the Redbooks may be helpful. You may need books from the z/OS Library as well.


<http://www.ibm.com/software/data/db2/zos/v9books.html>

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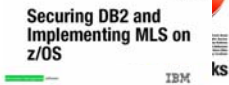
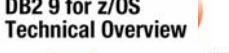



Be sure to use the latest information to save time and problems. Some of the IBM Redbooks publications have always been updated and added lately.





**DB2 9 for z/OS RedBooks & RedPapers**

- Powering SOA with IBM Data Servers SG24-7259
- LOBs with DB2 for z/OS: SG24-7270
- Securing DB2 & MLS z/OS SG24-6480-01
- DB2 9 Technical Overview SG24-7330
- Enhancing SAP - DB2 9 SG24-7239
- Best practices SAP BI - DB2 9 SG24-6489-01
- DB2 9 Performance Topics SG24-7473
- DB2 9 Optimization Service Center SG24-7421
- Index Compression with DB2 9 for z/OS paper
- DB2 9 Stored Procedures SG24-7604

65

DB2 library more information <http://www.ibm.com/software/data/db2/zos/library.html>

Eight IBM Redbooks publications and one Redpaper with substantial DB2 9 content are on the web, with more in the works. Check for updates.

- Powering SOA with IBM Data Servers, SG24-7259  
<http://www.redbooks.ibm.com/abstracts/SG247259.html>
- LOBs with DB2 for z/OS: Stronger & Faster SG24-7270  
<http://www.redbooks.ibm.com/abstracts/SG247270.html>
- Securing DB2 & MLS z/OS, SG24-6480-01  
<http://www.redbooks.ibm.com/abstracts/sg246480.html>
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<http://www.redbooks.ibm.com/abstracts/sg246489.html>
- DB2 9 Performance Topics, SG24-7473, in review  
<http://www.redbooks.ibm.com/abstracts/SG247473.html>
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- DB2 9 Optimization Service Center, SG24-7421,  
<http://www.redbooks.ibm.com/abstracts/sg247421.html>
- DB2 for z/OS Stored Procedures: CALL & Beyond SG24-7604  
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To see the most current files, you can use the ftp server directly with Internet Explorer, then sort by the date modified.

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[ibm.com/software/db2zos](http://ibm.com/software/db2zos)


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69

See this page for all the changes in IBM Data Studio. Watch closely, as this area is changing fast.

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See zIIP information on the web. This web site has the most current information, & pointers to more resources. The zIIP is for customers who are concerned about costs for growth. One big cost reduction is hardware cost, which is much less than a standard processor. The biggest cost reductions are in software, as IBM does not charge for software running on the specialty processors. The zIIP fits some customers very well, but will not apply for all. As a specialty processor, not all work can use the zIIP, which will only process work running under an enclave SRB. Most applications cannot run in SRB mode. The specifics of the software charging need to be considered. Customers must be current on hardware (System z9), current on software (z/OS 1.6 or later, DB2 V8 or later) and have a work load peak using the types of work eligible for zIIP:

Remote SQL processing of DRDA network-connected applications over TCP/IP: These DRDA applications include ERP (e.g. SAP or PeopleSoft), CRM (Siebel), and business intelligence running on other platforms. Remote SQL is expected to provide the primary benefits to customers, as it is commonly part of the peak load. Stored procedures and UDFs run under TCBs, so they are not generally eligible for zIIP, except for the call, commit and result set processing. DB2 9 remote native SQL Procedure Language is eligible for zIIP .

Parallel queries: If the work comes in remotely over DRDA using TCP/IP, then the initial work is eligible as remote work. After the initial time, the parallel processing threads are eligible and can process on the zIIP.

DB2 utility index processing: Functions of the LOAD, REORG and REBUILD DB2 utilities that perform index maintenance are eligible for zIIP. This is not a common peak capacity constraint, but could be useful in reducing CPU charges.

The best way to estimate the eligible work is to apply the needed z/OS and DB2 service, to run your work load and to take measurements. Use DB2 accounting with any product which can provide DB2 accounting reports, such as Omegamon.

**DB2 for z/OS Roadmap Page**  
[ibm.com/software/db2zos/roadmap.html](http://ibm.com/software/db2zos/roadmap.html)

United States [ change ]

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Welcome Mr. Roger Miller [Not you?] [ IBM Sign in ]

Software > Information Management > Data Servers > DB2 Product Family

**DB2 for z/OS**  
 Features and benefits  
 System requirements  
 Library  
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**DB2 for z/OS**  
 DB2 for z/OS Information Roadmap

Information Management software

**Other roadmaps**  
 → Content Manager  
 → IMS™  
 → SQL Replication Version 8.2

- Product overview
- Planning
- Installing
- Migrating
- Configuring
- Administering
- Developing
- Scenarios
- Samples
- Debugging
- Testing
- Security
- Monitoring and tuning
- Troubleshooting and Support
- Reference

This roadmap outlines the information resources that are available for installation, administration, and programming for DB2 for z/OS.

PDF files require Adobe® Reader®

**Product overview**

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Don't you wish you could find all of the different kinds of information about DB2 for z/OS in one place? I think you'll be happy to learn about a new Web page called the DB2 for z/OS Information Roadmap. Information roadmaps are being developed by many IBM product teams in an effort to simplify the lives of users by providing a single place to find all sorts of useful information resources, such as: Product information from the official library IBM Redbooks Articles in a variety of different online publications, including the DB2 Magazine, presentations, support information like answers to frequently asked questions or technotes, web pages with high-level descriptions of different products that DB2 works with and more. We tried to provide a simple way to get to many of the best resources for various tasks. This will be a great resource to people just starting to use a DB2 capability that they haven't yet used.

The information roadmap is organized according to different tasks that you might perform, such as migrating, configuring, administering, and debugging. Although the information roadmap is available for Version 8, it is available to anyone with Web access, and many of the resources are relevant and useful to users who aren't yet on Version 8.

I encourage you to check out the new DB2 for z/OS Information Roadmap: <http://www.ibm.com/software/data/db2/zos/roadmap.html>

You can also start from the main DB2 for z/OS web page and click on the Information Roadmap news item or <http://www.ibm.com/software/db2zos>

**DB2 Support Page**  
[ibm.com/software/db2zos/support.html](http://ibm.com/software/db2zos/support.html)

Technotes (FAQs)  
 Presentations  
 White papers  
 Redbooks  
 ✓ new books  
 APARs, CST

DB2 for z/OS  
 Features and benefits  
 System requirements  
 Library  
 Success stories  
 News  
 How to buy  
 Events  
 Training and certification  
 Services  
 Support

DB2 for z/OS  
 Product support  
**Primary support resources**  
**Flash 2** May, 2007: How can I redeploy an SQL stored procedure without rebuilding it?  
**Flash 1** Nov, 2006: URGENT: Effects of Daylight Saving Time changes on your systems and applications  
**Flash 21** Jul, 2006: IBM Software Support Toolbar  
 [View all Flashes]

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 • Featured documents  
 • Technotes | APARs

**Search Support (this product)**  
 Enter terms, error code or APAR #

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Do you need Answers to Frequently Asked Questions? Product Information? Technical Presentations? Redbooks? White Papers? Support for all of these is on this web page. Click Support on DB2 web pages. From this page, you access roughly 800 Technotes or answers to Frequently Asked Questions, technical presentations from recent conferences, a dozen white papers, and over 50 Redbooks. For more presentations, see the Events page. The Consolidated Service Test (CST) documents IBM recommended service level for a range of z/OS products.

To search for the presentation you want, put a word or two into the Additional search terms or Order by date – newest first.

There are new and updated redbooks on Powering SOA with IBM Data Servers, LOBs with DB2 for z/OS: Stronger and Faster, V8 Performance Topics, Data Sharing in a Nutshell, Data Integrity, Stored Procedures: Through the Call and Beyond, Design Guidelines for High Performance and Availability, Disaster Recovery, and Security Improvements.

[ibm.com/software/db2zos/support.html](http://ibm.com/software/db2zos/support.html)



## DB2 9 Library page

[ibm.com/software/data/db2/zos/v9books.html](http://ibm.com/software/data/db2/zos/v9books.html)



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- DB2 new
- ✓February 29, 2008
- Program Directories
- Information Center

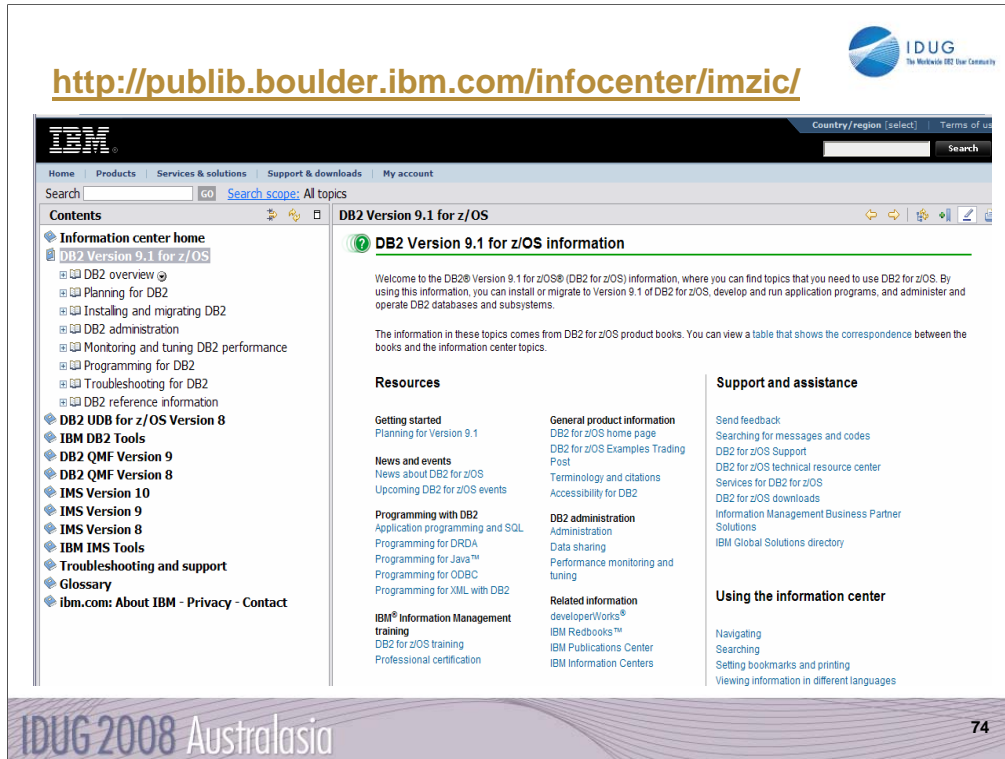
DB2 for z/OS			
Title (Order Number)	Published	HTML	PDF Updates
Administration Guide SC18-9840-01	Oct 2007	HTML	Updates
Application Programming & SQL Guide SC18-9841-01	Oct 2007	HTML	Updates

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73

This is the Library page for DB2 9. I clicked Library, and then DB2 9 to get here. There are about 40 PDF books and about the same number of books in html or BookManager format. Choose the style you want. I generally download the PDF books to my computer. From this page you can get books on DB2 and QMF, including both the library and program directories. If you need to look for some tools that can be downloaded, such as Estimator or Visual Explain, click on Downloads. You can also get to the new Information Center from here.

Watch this web page and see the dates next to each book for the latest updates.



This is the Information Center, with a wide spectrum of information and access to books for DB2 for z/OS, DB2 tools, QMF, IMS, IMS tools and more. You can get to this page from the Library page, by clicking Information Center. The Information Center provides information across the books and across multiple products.

If you click “Troubleshooting and Support”, then expand under “Searching knowledge base” and click “Web search:...”, you’ll find a helpful Web search page. From this page, you can search IBM support, DeveloperWorks, or even the whole Internet using Google.

# DB2 Cross-Platform SQL Reference

updating for DB2 9



<http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html>

**SELECT FROM 1**  
INSERT INTO  
**Portable SQL**

The SQL Reference for Cross-Platform Development

June 2002 (Updated September 22, 2004)

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Great news for people who want to write portable applications! This reference makes it easy for you to develop applications using SQL that is portable across the **DB2 Universal Database Family**, including [DB2 UDB for z/OS® Version 8](#), [DB2 UDB for iSeries™ Version 5 Release 3](#), and [DB2 UDB for Linux, UNIX®, and Windows® Version 8.1](#).

**New in Version 2!**

The addition of DB2 UDB for z/OS V8 and DB2 UDB for iSeries V5R3 means the following great SQL features are now included:

- Support of sequences
- A new CURRENT SCHEMA special register
- Enhanced support for scalar subselect
- New built-in functions including encryption support
- Support for common table expressions
- Support for lateral correlation
- Support of grouping by expressions
- Support for materialized query tables
- Support for altering identity columns
- Support for ITERATE statement
- Increases in several SQL limits, and enhanced long string support
- Other portability enhancements

The *SQL Reference for Cross-Platform Development* uses the familiar format of the product SQL Reference manuals and includes information on the following topics:

- Database concepts
- Built-in functions
- Statements and queries
- SQL procedural language control statements
- Limits
- Programming in C, Java™, COBOL, REXX, and external routines in general

Related links:  
• DW resources  
• alphaWorks (alpha technologies)  
• Academic program  
• IBM DeveloperWorks

75

This is the old web page for the SQL Reference for Cross-Platform Development. It has three versions of the cross-platform SQL Reference and pointers to the base product SQL Reference books as well. If you want to write programs that work well across the DB2 family, then this is the book to download and use.

These books publish frequently, so you need to choose the one for the proper combination of DB2 platforms and versions.

<http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html>

Events for more info ...

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IBM Tech Conferences

SHARE

Presentations

There are many excellent conferences coming up. Use the Events page to see which one you can attend:

<http://www.ibm.com/software/data/db2/zos/events.html>

If you missed a conference or two, then check for recent presentations from previous conferences. More than 150 presentations are on the web, some with audio as well. 2008 conferences:

<u>conference</u>	<u>dates</u>	<u>location</u>	<u>web location</u>
IDUG NA	May 18 - 22	Dallas, Texas	www.idug.org
Share	Feb 24 – 29	Orlando, FL	
	Aug 10 - 15	San Jose, CA	www.share.org
IBM IOD Europe	June 2 – 6	Den Haag, Netherlands	
IDUG Europe	Oct 13 - 17	Warsaw, Poland	www.idug.org
IBM IOD NA	Oct 26 – 31	Las Vegas, NV	

[ibm.com/events/InformationOnDemand](http://ibm.com/events/InformationOnDemand)

IBM Technical Conferences

<http://www.ibm.com/services/learning/ites.wss?pageType=page&c=a0001438>

[www.ibm.com/software/data/db2imstools/](http://www.ibm.com/software/data/db2imstools/)

Click Support For Compatibility Matrix → → → & V8 or DB2 9

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Software > Information Management >

**IBM DB2 and IMS Tools**

Information Management software

Portfolio of DB2 & IMS Tools

Introducing z9-109

z9-109

Learn more

Highlights

Register for EMEA IM Tech Con, The Hague May 15

Register for IDUG NA, Tampa, May 7

Register for June 8

Related software

- DB2
- IMS
- DB2 QMF
- CICS Tools
- WebSphere MQ Family
- WebSphere AD Tools

Related hardware

- zSeries
- Storage Systems
- IBM eServer
- Warranty info

Select a DB2 Tool

Select an IMS Tool

Select a WebSphere Information Integration Tool

Go

Go

Go

**DB2 Tools for Linux, Unix, and Windows**

- Visit the DB2 Multiplatform Tools webpage
- Read the DB2 Multiplatform Tools overview fact sheet.
- NEW! DB2 Toolkit for Multiplatforms V1.1 brings

**New / Enhanced DB2 z/OS Tools**

**Announced March 2006**

- DB2 SQL Performance Analyzer, V3.1

**Announced December 2005**

- DB2 Change Accumulation Tool, V1.4

IDUG 2008 Australasia 77

This is the primary web page for DB2 and IMS tools. If you want to know exactly which levels of each tool work with DB2 for z/OS Version 8 or with DB2 9 for z/OS, then go to the Support page for the tools. You may find the item directly on the Support page. Or click Technotes (FAQs) and search for items that include DB2 9 or V8 and PTF. Select the item DB2 Data Management Tools and DB2 for z/OS V8.1 or DB2 9 compatibility. This table provides the minimum maintenance required for DB2 Tools to support DB2 for z/OS V8. The Support page has a wide range of other detail about these products.

http://www.ibm.com/support/docview.wss?rs=434&context=SSZJXP&dc=D600&uid=swg21256800

**DB2 Data Management Tools and DB2 for z/OS V9.1 Compatibility**

**Abstract**  
This table provides the minimum maintenance required for DB2® Tools to support DB2 for z/OS V9.1.

**Content Key:**

- NS = Not Supported**  
The product does not function properly on DB2 V9.
- T = Tolerate**  
Allows the product to execute as it did on a previous release of DB2 but does not utilize any of the new DB2 V9 functions.
- E = Exploit**  
The product utilizes the new functions and features available in DB2 V9.

**NOTE: If the product is not listed in the matrix, it is not supported on DB2 V9. For new products that have been released after this matrix was published contact your IBM Sales Representative for DB2 V9 compatibility.**

DB2 Tools	VRM	DB2 V9 Support			Comments
		NS	T	E	
Application Recovery Tool	1.2.0		X		PK33728
Data Encryption	1.1.0		X		No PTF necessary
DB2 Administration Tool	7.2.0		X		No PTF necessary
	7.1.0	X			
DB2 Administration Toolkit for z/OS SAP Edition	2.1.0		X		No PTF necessary
	1.1.0	X			
DB2 Archive Log Accelerator	2.2.0		X		PK38140(See * below)

**Product categories:**  
Software  
Data & Information Management  
Database Tools & Utilities  
DB2 and IMS Tools

**Operating system (s):**  
z/OS

**Software version:**  
9.1.0

**Reference #:**  
1256800

**IBM Group:**  
Software Group

**Modified date:**  
2007-03-16

IDUG 2008 Australasia 78

This is the resulting page today, looking for the Information Management Tools releases and service needed to work with DB2 9 for z/OS. Note that the matrix lists some levels of tools with an X in the NS or not supported column. See the later version, with an X under T for toleration or under E for exploit or the ability to use those new improvements.

[www.ibm.com/developerworks/db2/products/db2zos/](http://www.ibm.com/developerworks/db2/products/db2zos/)  
[www.ibm.com/developerworks/db2/zones/porting/](http://www.ibm.com/developerworks/db2/zones/porting/)  
[www.ibm.com/software/data/db2/migration/](http://www.ibm.com/software/data/db2/migration/)

developerWorks > Information Management > Products >  
**DB2 for z/OS and OS/390**  
 DB2® on the mainframe allows you to run powerful enterprise applications and make e-commerce a reality. developerWorks is the technical resource center for DB2 for z/OS® and OS/390®.  
 Updated 15 Feb 2007

**Top story**  
**Use DB2 Version 9.1 for z/OS to implement application session locking**  
 A new feature, "SKIP LOCKED DATA," gives you the capability to implement application-level session locking, allowing intermediate DB2 commits. [More >](#)

**Information Management software**  
 We're here to help  
 Easy ways to get the answers you need.  
 Call me  
 E-mail us

**Spotlight**  
 Reference tables: Common SQL fea  
 DB2 9 for z/OS beta

IDUG 2008 Australasia 79

There is extensive help for applications and porting to DB2 on the web, with suggestions for the process and many resources, including a migration toolkit. The dramatically improved DB2 family compatibility in DB2 for z/OS V7, V8 and DB2 9 makes porting to DB2 for z/OS from other platforms much easier.

<http://www.ibm.com/developerworks/db2/products/db2zos/>

<http://www.ibm.com/developerworks/db2/zones/porting/>

<http://www.ibm.com/software/data/db2/migration/>

Here is the URL for the main DeveloperWorks page

<http://www.ibm.com/developerworks/db2/>

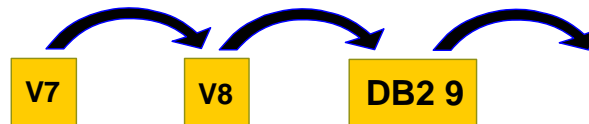
There is also a DeveloperWorks page on DB2 for z/OS.

<http://www.ibm.com/developerworks/db2/products/db2zos/>

For migration information for specific databases, try

<http://www.ibm.com/developerworks/ondemand/migrate/db.html>

## Migration Path: DB2 V7 to DB2 9



Objectives? Time? Availability? Do you need fallback?  
 Data Sharing Coexistence? Outage permitted? How long?  
 When to migrate? Service desired? Version in service?  
 Option 1: V8 stage 2 – 6 months, stabilize & move  
 Option 2: Unload application, definitions & data; Load  
 Option 3: V8 on weekend then to DB2 9

Fallback only to V8 → no fallback, no coexistence  
 DO NOT skip steps

Do you want to migrate from V7 to DB2 9? We have a number of questions to ask. V8 provided a massive reengineering of the DB2 structure, memory and catalog, so it is particularly difficult to skip. The first question is the objective in terms of time you expect to save, need for availability and safety. If you need data sharing coexistence, then V7 to DB2 9 is not an option. In essence, if you need fallback, V7 to DB2 9 is not an option, since the only fallback would be to V8. Fallback to a version you have not run might not be an improvement.

The next questions are timing and service. Do you want support? DB2 9 became generally available March 2007. When can you migrate to it? DB2 V7 goes out of service June 2008. Migrating to DB2 V8 is faster, easier and smoother.

The best option, option 1 would be to move to V8, stabilize and adjust, move into NFM for a few months at least, and then migrate to DB2 9. If an application, the definitions and data can be unloaded and reloaded, then you can skip versions. You don't have subsystem coexistence or fallback. So option 2 takes more work and requires more testing, but the migration can be more granular, if your applications permit. An option that we cannot recommend is a fast jump from V7 to DB2 9. You do not have migration or coexistence. Our experience from other customer situations is that skipping migration steps can cause significant problems.

In short, the safest process, by far, is the one tested by years of work in the lab and thousands of customer experiences. You can choose your own path, but the shortcut can be the longest way. Your own path has much more risk. An unsupported path adds risk and can add a lot of cost.



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Session A02 & A03  
**Migration to DB2 9 for z/OS**



Roger Miller  
IBM Silicon Valley Lab  
millerrl@us.ibm.com

Thanks for coming.





## Eliminate private protocol



- **Problem:** Cannot easily migrate those, applications to DRDA
  - DRDA requires packages on each server accessed by application,
  - Process of creating the packages not automated, prone to errors
- **Stakeholders Affected:** DBA, Application programmer
- **Impact:**
  - Application programmers can't use new function with private protocol
  - DBA can't drive migration to DRDA
- **External aspects of a successful solution:**
  - Allow DBA to easily identify which applications use private protocol
  - Allow application programmer to easily build DRDA applications
  - Provide consumable migration from private to DRDA

**The Problem:** Customers that perform distributed processing using DB2's private protocol, which has been deprecated since V5, cannot easily migrate those applications to the fully-supported, standards-based DRDA protocol and thus cannot exploit all the functional and system improvements added to DB2 since V5. The problems that inhibit customers from migrating to DRDA include:

DRDA requires that a package must be created on each server accessed by a DRDA application, but some customers no longer have the source code and/or DBRMs for some of their applications

The process of creating the packages required by DRDA is not automated, making the migration process one that requires special expertise that may not be readily available to the customer, is costly in time and resource, and is prone to errors

**Stakeholders Affected:** DBA, Application programmer

**Impact:** Application programmers can't use new function with private protocol  
DBA can't drive migration to DRDA

**External aspects of a successful solution:**

Allow the DBA to easily identify which applications use private protocol

Allow application programmer to easily build DRDA applications

Provide consumable migration from private to DRDA

## Overview of private protocol removal



- Complete elimination of private protocol in DB2 X: No inbound or outbound
  - Remove capabilities only for private protocol
- DRDA protocol enhancements for “look and feel” of private protocol
  - New BIND/REBIND options to BIND once but bind at multiple locations
  - Alias resolution into SQL during BIND and dynamic SQL like private protocol
- DB2 X CATMAINT prevents migration if source catalog has private protocol objects
- Delivery of BIND / REBIND commands to V8 & DB2 9
- Provide V8 & DB2 9 ability to totally disable private protocol for “testing” purposes
- Enhancement to the V8/DB2 9 private protocol to DRDA protocol conversion tools
  - DB2 9 DSNTDP2DP REXX program will use new BIND options and “REBIND PLAN COLLID” enhancement and will be delivered to V8
  - Provide DSN1PPTP program to generate usable format of private protocol trace records that can then be used by DSNTDP2DP

Complete elimination of private protocol in DB2 X: No inbound or outbound

Remove capabilities that applied only to private protocol

DRDA protocol enhancements for “look and feel” of private protocol

New BIND/REBIND options to BIND once but bind at multiple locations

Alias resolution into SQL during BIND and dynamic SQL like private protocol

DB2 X CATMAINT will prevent migration where source catalog has private protocol objects

Delivery of BIND/REBIND commands to V8 & DB2 9

Provide V8 & DB2 9 ability to totally disable private protocol for “testing” purposes

Enhancement to the V8 / DB2 9 private protocol to DRDA protocol conversion tools

DB2 9 DSNTDP2DP REXX program will use new BIND options and “REBIND PLAN COLLID” enhancement and will be delivered to V8

Provide DSN1PPTP program to generate usable format of private protocol trace records that can then be used by DSNTDP2DP

## New BIND/REBIND Package Options

- DISTRIBUTE(ANY | location-name-list | NONE)
  - BIND/REBIND detects location references in SQL and CONNECTs
  - Package bound locally then BIND PACKAGE COPY'd with resolved aliases
  - Package bound with DISTRIBUTE(ANY) or DISTRIBUTE(location-name-list) triggers alias resolution
  - DISTRIBUTE bind option will not flow to remote locations
  - FREE PACKAGE will free all dependent remote locations copies
  - Autobind disabled on packages bound with DISTRIBUTE(ANY) or DISTRIBUTE(location-name-list) - REBIND must be done
  - Examples:
    - BIND PACKAGE(COLLID1) MEMBER(DBRM1) DISTRIBUTE(ANY) ....
    - BIND PACKAGE(DSNESPCS) MEMBER(DSNESM68) DISTRIBUTE(LOC1,LOC2,LOC3)
    - REBIND PACKAGE(COLLID1.DBRM1)

DISTRIBUTE(ANY|location-name-list|NONE)

BIND/REBIND detects location references in SQL and CONNECTs

Package is first bound locally with original text of statements and then BIND PACKAGE COPY'd to each detected and/or specified location with statements containing resolved aliases

Package bound with DISTRIBUTE(ANY) or DISTRIBUTE(location-name-list) will trigger alias resolution during dynamic SQL prepare

REBIND will first check for current package location dependencies and free package from any location that no longer applies prior to BIND PACKAGE COPYING to remaining locations

DISTRIBUTE bind option will not flow to remote locations

Distributed client could cause a "hopping" bind, i.e. client to server to downstream server

DB2 9 already has support for bind hopping to support remote client BIND DEPLOY

Must be added to V8

FREE PACKAGE will free all dependent remote locations copies

Autobind will be disabled on any package that was bound with DISTRIBUTE(ANY) or DISTRIBUTE(location-name-list) - REBIND must be done

Examples:

BIND PACKAGE(COLLID1) MEMBER(DBRM1) DISTRIBUTE(ANY) ....

BIND PACKAGE(DSNESPCS) MEMBER(DSNESM68) DISTRIBUTE(LOC1,LOC2,LOC3)

REBIND PACKAGE(COLLID1.DBRM1) after an alias change, which caused package to become invalid, will find a new location in list of locations to be bind targets and another location that is no longer in the new list which then must be freed