IBM® DB2® Universal Database

Administrative API Reference

Version 7

SC09-2947-00

IBM® DB2® Universal Database

Administrative API Reference

Version 7

SC09-2947-00

Before using this information and the product it supports, be sure to read the general information under "Appendix I. Notices" on page 657.

Order publications through your IBM representative or the IBM branch office serving your locality or by calling 1-800-879-2755 in the United States or 1-800-IBM-4YOU in Canada.

Contents

About This Book

This book provides information about the use of application programming interfaces (APIs) to execute database administrative functions. It presents detailed information on the use of database manager API calls in applications written in the following programming languages:

- C
- COBOL
- FORTRAN
- REXX.

For a compiled language, an appropriate precompiler must be available to process the statements. Precompilers are provided for all supported languages.

Who Should Use this Book

It is assumed that the reader has an understanding of database administration and application programming, plus a knowledge of:

- Structured Query Language (SQL)
- The C, COBOL, FORTRAN, or REXX programming language
- Application program design.

How this Book is Structured

This book provides the reference information needed to develop administrative applications.

The following topics are covered:

Chapter 1
Provides a description of all database manager APIs.

Chapter 2
Describes DB2 APIs that are only supported in the REXX programming language.

Chapter 3
Describes data structures used when calling APIs.

Appendix A
Explains the conventions used to name objects such as databases and tables.

Appendix B
Provides a description of transaction and heuristic APIs.

Appendix C
Describes how to contact IBM for information about the function and use of APIs that enable the customization of precompilers.

Appendix D
Describes the function and use of APIs that enable DB2 to interface with other vendor software.

Appendix E
Describes APIs that permit the allocation of separate environments or contexts for each thread within a process, enabling true concurrent access to a DB2 database.

Appendix F
Provides information on extracting and working with DB2 log records.

Appendix G
Discusses issues that should be considered before migrating an application to DB2 Version 6.

Chapter 1. Application Programming Interfaces

This chapter describes the DB2 application programming interfaces in alphabetical order. The APIs enable most of the administrative functions from within an application program.

Note: Slashes (/) in directory paths are specific to UNIX based systems, and are equivalent to back slashes (\) in directory paths on OS/2 and Windows operating systems.

DB2 APIs

The following table lists the APIs grouped by functional category:

Table 1. DB2 APIs

API Description	Sample Code [a]	INCLUDE File [b]
Database Manager Control		
"sqlepstart - Start Database Manager" on page 230	makeapi, dbstart	sqlenv
"sqlepstp - Stop Database Manager" on page 233	makeapi, dbstop	sqlenv
"sqlfxsys - Get Database Manager Configuration" on page 278	dbmconf	sqlutil
"sqlfdsys - Get Database Manager Configuration Defaults" on page 261	d_dbmcon	sqlutil
"sqlfrsys - Reset Database Manager Configuration" on page 266	dbmconf	sqlutil
"sqlfusys - Update Database Manager Configuration" on page 272	dbmconf	sqlutil
"sqlesdeg - Set Runtime Degree" on page 245	setrundg	sqlenv
Database Control		
"db2DatabaseRestart - Restart Database" on page 24	n/a	db2ApiDf
"sqlecrea - Create Database" on page 159	dbconf	sqlenv
"sqlecran - Create Database at Node" on page 157	n/a	sqlenv
"sqledrpd - Drop Database" on page 188	dbconf	sqlenv
"sqledpan - Drop Database at Node" on page 184	n/a	sqlenv
"sqlemgdb - Migrate Database" on page 221	migrate	sqlenv

Table 1. DB2 APIs (continued)

API Description	Sample Code [a]	INCLUDE File [b]
"sqlxphqr - List Indoubt Transactions" on page 548	n/a	sqlxa
"sqle_activate_db - Activate Database" on page 132	n/a	sqlenv
"sqle_deactivate_db - Deactivate Database" on page 135	n/a	sqlenv
"sqlcspqy - List DRDA Indoubt Transactions" on page 130	n/a	sqlxa
Database Directory Management		
"sqlecadb - Catalog Database" on page 149	dbcat	sqlenv
"sqleuncd - Uncatalog Database" on page 254	dbcat	sqlenv
"sqlegdad - Catalog DCS Database" on page 200	dcscat	sqlenv
"sqlegdel - Uncatalog DCS Database" on page 205	dcscat	sqlenv
"sqledcgd - Change Database Comment" on page 173	dbcmt	sqlenv
"sqledosd - Open Database Directory Scan" on page 181	dbcat	sqlenv
"sqledgne - Get Next Database Directory Entry" on page 178	dbcat	sqlenv
"sqledcls - Close Database Directory Scan" on page 176	dbcat	sqlenv
"sqlegdsc - Open DCS Directory Scan" on page 213	dcscat	sqlenv
"sqlegdgt - Get DCS Directory Entries" on page 210	dcscat	sqlenv
"sqlegdcl - Close DCS Directory Scan" on page 203	dcscat	sqlenv
"sqlegdge - Get DCS Directory Entry for Database" on page 208	dcscat	sqlenv
Client/Server Directory Management		
"sqlectnd - Catalog Node" on page 168	nodecat	sqlenv
"sqleuncn - Uncatalog Node" on page 257	nodecat	sqlenv
"sqlenops - Open Node Directory Scan" on page 228	nodecat	sqlenv
"sqlengne - Get Next Node Directory Entry" on page 225	nodecat	sqlenv
"sqlencls - Close Node Directory Scan" on page 223	nodecat	sqlenv
Network Support		
"sqleregs - Register" on page 241	regder	sqlenv
"sqledreg - Deregister" on page 186	regder	sqlenv

Table 1. DB2 APIs (continued)

API Description	Sample Code [a]	INCLUDE File [b]
"db2LdapRegister" on page 54	n/a	db2ApiDf
"db2LdapUpdate" on page 62	n/a	db2ApiDf
"db2LdapDeregister" on page 52	n/a	db2ApiDf
"db2LdapCatalogNode" on page 50	n/a	db2ApiDf
"db2LdapUncatalogNode" on page 60	n/a	db2ApiDf
"db2LdapCatalogDatabase" on page 47	n/a	db2ApiDf
"db2LdapUncatalogDatabase" on page 58	n/a	db2ApiDf
Database Configuration		
"sqlfxdb - Get Database Configuration" on page 275	dbconf	sqlutil
"sqlfddb - Get Database Configuration Defaults" on page 259	d_dbconf	sqlutil
"sqlfrdb - Reset Database Configuration" on page 263	dbconf	sqlutil
"sqlfudb - Update Database Configuration" on page 268	dbconf	sqlutil
Recovery		
"sqlubkp - Backup Database" on page 290	backrest	sqlutil
"sqlurcon - Reconcile" on page 374	n/a	sqlutil
"sqlurestore - Restore Database" on page 381	backrest	sqlutil
"sqluroll - Rollforward Database" on page 397	backrest	sqlutil
"db2HistoryOpenScan - Open Recovery History File Scan" on page 39	n/a	db2ApiDf
"db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36	n/a	db2ApiDf
"db2HistoryCloseScan - Close Recovery History File Scan" on page 34	n/a	db2ApiDf
"db2Prune" on page 72	n/a	db2ApiDf
"db2HistoryUpdate - Update Recovery History File" on page 44	n/a	db2ApiDf
Operational Utilities		
"sqlefrce - Force Application" on page 196	dbstop	sqlenv
"sqlureot - Reorganize Table" on page 377	dbstat	sqlutil
"sqlustat - Runstats" on page 407	dbstat	sqlutil
Database Monitoring		

Table 1. DB2 APIs (continued)

API Description	Sample Code [a]	INCLUDE File [b]
"db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer" on page 30	db2mon	sqlmon
"db2MonitorSwitches - Get/Update Monitor Switches" on page 69	db2mon	sqlmon
"db2GetSnapshot - Get Snapshot" on page 27	n/a	db2ApiDf
"db2ResetMonitor - Reset Monitor" on page 78	db2mon	sqlmon
"db2ConvMonStream" on page 21	n/a	db2ApiDf
Data Utilities		
"sqluexpr - Export" on page 302	impexp	sqlutil
"sqluimpr - Import" on page 320	impexp	sqlutil
"sqluload - Load" on page 345	tload	sqlutil
"db2LoadQuery - Load Query" on page 65	loadqry	db2ApiDf
General Application Programming		
"db2AutoConfig" on page 17	autoconf	db2AuCfg
"db2AutoConfigFreeMemory" on page 20	autoconf	db2AuCfg
"sqlaintp - Get Error Message" on page 90	util, checkerr	sql
"sqlogstt - Get SQLSTATE Message" on page 284	util, checkerr	sql
"sqleisig - Install Signal Handler" on page 219	dbcmt	sqlenv
"sqleintr - Interrupt" on page 217	n/a	sqlenv
"sqlgdref - Dereference Address" on page 282	n/a	sqlutil
"sqlgmcpy - Copy Memory" on page 283	n/a	sqlutil
"sqlefmem - Free Memory" on page 195	tspace	sqlenv
"sqlgaddr - Get Address" on page 281	n/a	sqlutil
Application Preparation		
"sqlaprep - Precompile Program" on page 93	makeapi	sql
"sqlabndx - Bind" on page 85	makeapi	sql
"sqlarbnd - Rebind" on page 99	rebind	sql
Remote Server Utilities		
"sqleatin - Attach" on page 145	dbinst	sqlenv
"sqleatcp - Attach and Change Password" on page 141	dbinst	sqlenv
"sqledtin - Detach" on page 193	dbinst	sqlenv

Table 1. DB2 APIs (continued)

API Description	Sample Code [a]	INCLUDE File [b]
Table Space Management		
"sqlbtcq - Tablespace Container Query" on page 127	tabscont	sqlutil
"sqlbotcq - Open Tablespace Container Query" on page 116	tabscont	sqlutil
"sqlbftcq - Fetch Tablespace Container Query" on page 107	tabscont	sqlutil
"sqlbctcq - Close Tablespace Container Query" on page 103	tabscont	sqlutil
"sqlbstsc - Set Tablespace Containers" on page 124	backrest	sqlutil
"sqlbmtsq - Tablespace Query" on page 113	tabspace	sqlutil
"sqlbstpq - Single Tablespace Query" on page 122	tabspace	sqlutil
"sqlbotsq - Open Tablespace Query" on page 119	tabspace	sqlutil
"sqlbftpq - Fetch Tablespace Query" on page 109	tabspace	sqlutil
"sqlbctsq - Close Tablespace Query" on page 105	tabspace	sqlutil
"sqlbgtss - Get Tablespace Statistics" on page 111	tabspace	sqlutil
"sqluvqdp - Quiesce Tablespaces for Table" on page 413	tload	sqlutil
Node Management		
"sqleaddn - Add Node" on page 138	n/a	sqlenv
"sqledrpn - Drop Node Verify" on page 191	n/a	sqlenv
Nodegroup Management		
"sqludrdt - Redistribute Nodegroup" on page 298	n/a	sqlutil
Additional APIs		
"sqluadau - Get Authorizations" on page 287	dbauth	sqlutil
"sqlegins - Get Instance" on page 215	dbinst	sqlenv
"sqleqryc - Query Client" on page 236	client	sqlenv
"sqleqryi - Query Client Information" on page 239	cli_info	sqlenv
"sqlesetc - Set Client" on page 248	client	sqlenv
"sqleseti - Set Client Information" on page 251	cli_info	sqlenv
"sqlesact - Set Accounting String" on page 243	setact	sqlenv
"sqlurlog - Asynchronous Read Log" on page 394	asynrlog	sqlutil
"sqlugrpn - Get Row Partitioning Number" on page 314	n/a	sqlutil

Table 1. DB2 APIs (continued)

API Description	Sample Code [a]	INCLUDE File [b]
"sqlugtpi - Get Table Partitioning Information" on page 318	n/a	sqlutil
"db2AdminMsgWrite" on page 15	n/a	db2ApiDf

Note:

[a] The sample programs can be found in the language specific directory of the `samples` directory in the `sqllib` directory (for example, `sqllib\samples\c` for C source code). The file extensions on sample code depend on the programming language being used. For example, for sample code written in C, the extension is `.c` or `.sqc`. Not all programs are available in all supported programming languages. Not all APIs have sample code (indicated by n/a).

[b] The file extensions on INCLUDE files depend on the programming language being used. For example, an INCLUDE file written for C has a file extension of `.h`. The INCLUDE files can be found in directory `sqllib\include` (directory delimiters are dependant upon the operating system).

DB2 Sample Programs

The following tables list the APIs grouped by sample program. Table 2 lists the APIs that are called by programs which contain no embedded SQL, while Table 3 on page 9 lists the APIs that are called by programs which do contain embedded SQL:

Table 2. DB2 APIs by Sample Program (with No Embedded SQL)

Sample Code	Included APIs
backrest	• sqlbftcq - Fetch Tablespace Container Query • sqlbstsc - Set Tablespace Containers • sqlfudb - Update Database Configuration • sqlubkp - Backup Database • sqluroll - Rollforward Database • sqlurst - Restore Database
checkerr	• sqlaintp - Get Error Message • sqlogstt - Get SQLSTATE Message
cli_info	• sqleqryi - Query Client Information • sqleseti - Set Client Information

Table 2. DB2 APIs by Sample Program (with No Embedded SQL) (continued)

Sample Code	Included APIs
client	• sqleqryc - Query Client • sqlesetc - Set Client
d_dbconf	• sqleatin - Attach • sqledtin - Detach • sqlfddb - Get Database Configuration Defaults
d_dbmcon	• sqleatin - Attach • sqledtin - Detach • sqlfdsys - Get Database Manager Configuration Defaults
db_udcs	• sqleatin - Attach • sqlecrea - Create Database • sqledrpd - Drop Database
db2mon	• sqleatin - Attach • db2MonitorSwitches - Get/Update Monitor Switches • db2GetSnapshot - Get Snapshot • db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer • db2ResetMonitorData - Reset Monitor
dbcat	• sqlecadb - Catalog Database • sqledcls - Close Database Directory Scan • sqledgne - Get Next Database Directory Entry • sqledosd - Open Database Directory Scan • sqleuncd - Uncatalog Database
dbcmt	• sqledcgd - Change Database Comment • sqledcls - Close Database Directory Scan • sqledgne - Get Next Database Directory Entry • sqledosd - Open Database Directory Scan • sqleisig - Install Signal Handler
dbconf	• sqleatin - Attach • sqlecrea - Create Database • sqledrpd - Drop Database • sqlfrdb - Reset Database Configuration • sqlfudb - Update Database Configuration • sqlfxdb - Get Database Configuration

Table 2. DB2 APIs by Sample Program (with No Embedded SQL) (continued)

Sample Code	Included APIs
dbinst	• sqleatcp - Attach and Change Password • sqleatin - Attach • sqledtin - Detach • sqlegins - Get Instance
dbmconf	• sqleatin - Attach • sqledtin - Detach • sqlfrsys - Reset Database Manager Configuration • sqlfusys - Update Database Manager Configuration • sqlfxsys - Get Database Manager Configuration
dbsnap	• sqleatin - Attach • db2GetSnapshot - Get Snapshot
dbstart	• sqlepstart - Start Database Manager
dbstop	• sqlefrce - Force Application • sqlepstp - Stop Database Manager
dcscat	• sqlegdad - Catalog DCS Database • sqlegdcl - Close DCS Directory Scan • sqlegdel - Uncatalog DCS Database • sqlegdge - Get DCS Directory Entry for Database • sqlegdgt - Get DCS Directory Entries • sqlegdsc - Open DCS Directory Scan
dmscont	• sqleatin - Attach • sqlecrea - Create Database • sqledrpd - Drop Database
ebcdicdb	• sqleatin - Attach • sqlecrea - Create Database • sqledrpd - Drop Database
migrate	• sqlemgdb - Migrate Database
monreset	• sqleatin - Attach • sqlmrset - Reset Monitor
monsz	• sqleatin - Attach • sqlmonss - Get Snapshot • sqlmonsz - Estimate Size Required for sqlmonss() Output Buffer

Table 2. DB2 APIs by Sample Program (with No Embedded SQL) (continued)

Sample Code	Included APIs
nodecat	• sqlectnd - Catalog Node • sqlencls - Close Node Directory Scan • sqlengne - Get Next Node Directory Entry • sqlenops - Open Node Directory Scan • sqleuncn - Uncatalog Node
regder	• sqledreg - Deregister • sqleregs - Register
restart	• sqlerstd - Restart Database
setact	• sqlesact - Set Accounting String
setrundg	• sqlesdeg - Set Runtime Degree
sws	• sqleatin - Attach • sqlmon - Get/Update Monitor Switches
util	• sqlaintp - Get Error Message • sqlogstt - Get SQLSTATE Message
Note: [a] The sample programs can be found in the language specific directory of the `samples` directory in the `sqllib` directory (for example, `sqllib\samples\c` for C source code). The file extensions on sample code depend on the programming language being used. For example, for sample code written in C, the extension is `.c` or `.sqc`. Not all programs are available in all supported programming languages. Not all APIs have sample code.	

Table 3. DB2 APIs by Sample Program (with Embedded SQL)

Sample Code	Included APIs
autoconf	• db2AutoConfig • db2AutoConfigFreeMemory
asynrlog	• sqlurlog - Asynchronous Read Log
bindfile	• sqlabndx - Bind
dbauth	• sqluadau - Get Authorizations
dbstat	• sqlureot - Reorganize Table • sqlustat - Runstats
expsamp	• sqluexpr - Export • sqluimpr - Import

Table 3. DB2 APIs by Sample Program (with Embedded SQL) (continued)

Sample Code	Included APIs
impexp	• sqluexpr - Export • sqluimpr - Import
loadqry	• db2LoadQuery - Load Query
makeapi	• sqlabndx - Bind • sqlaprep - Precompile Program • sqlepstp - Stop Database Manager • sqlepstr - Start Database Manager
rebind	• sqlarbnd - Rebind
rechist	• sqlubkp - Backup Database • sqluhcls - Close Recovery History File Scan • sqluhgne - Get Next Recovery History File Entry • sqluhops - Open Recovery History File Scan • sqluhprn - Prune Recovery History File • sqluhupd - Update Recovery History File
tabscont	• sqlbctcq - Close Tablespace Container Query • sqlbftcq - Fetch Tablespace Container Query • sqlbotcq - Open Tablespace Container Query • sqlbtcq - Tablespace Container Query • sqlefmem - Free Memory
tabspace	• sqlbctsq - Close Tablespace Query • sqlbftpq - Fetch Tablespace Query • sqlbgtss - Get Tablespace Statistics • sqlbmtsq - Tablespace Query • sqlbotsq - Open Tablespace Query • sqlbstpq - Single Tablespace Query • sqlefmem - Free Memory
tload	• sqluexpr - Export • sqluload - Load • sqluvqdp - Quiesce Tablespaces for Table

Table 3. DB2 APIs by Sample Program (with Embedded SQL) (continued)

Sample Code	Included APIs
tspace	• sqlbctcq - Close Tablespace Container Query • sqlbctsq - Close Tablespace Query • sqlbftcq - Fetch Tablespace Container Query • sqlbftpq - Fetch Tablespace Query • sqlbgtss - Get Tablespace Statistics • sqlbmtsq - Tablespace Query • sqlbotcq - Open Tablespace Container Query • sqlbotsq - Open Tablespace Query • sqlbstpq - Single Tablespace Query • sqlbstsc - Set Tablespace Containers • sqlbtcq - Tablespace Container Query • sqlefmem - Free Memory
Note: [a] The sample programs can be found in the language specific directory of the `samples` directory in the `sqllib` directory (for example, `sqllib\samples\c` for C source code). The file extensions on sample code depend on the programming language being used. For example, for sample code written in C, the extension is `.c` or `.sqc`. Not all programs are available in all supported programming languages. Not all APIs have sample code.	

How the API Descriptions are Organized

A short description of each API precedes some or all of the following subsections.

Scope

The API's scope of operation within the instance. In a single-node system, the scope is that single node only. In a multi-node system, it is the collection of all logical nodes defined in the node configuration file, `db2nodes.cfg`.

Authorization

The authority required to successfully call the API.

Required Connection

One of the following: database, instance, none, or establishes a connection. Indicates whether the function requires a database connection, an instance attachment, or no connection to operate successfully. An explicit connection to the database or attachment to the instance may be required before a particular API can be called. APIs that require a database connection or an instance attachment can be executed either locally or remotely. Those that require neither cannot be executed remotely; when called at the client, they affect the client environment only. For information about database connections and instance attachments, see the *Administration Guide*.

API Include File

The name of the include file that contains the API prototype, and any necessary predefined constants and parameters.

C API Syntax

The C syntax of the API call.

Starting in Version 6, a new standard is being applied to the DB2 administrative APIs. Implementation of the new API definitions is being carried out in a staged manner. Following is a brief overview of the changes:

- The new API names contain the prefix "db2", followed by a meaningful mixed case string (for example, db2LoadQuery). Related APIs have names that allow them to be logically grouped. For example:

  ```
  db2HistoryCloseScan
  db2HistoryGetEntry
  db2HistoryOpenScan
  db2HistoryUpdate
  ```

- Generic APIs have names that contain the prefix "db2g", followed by a string that matches the C API name. Data structures used by generic APIs have names that also contain the prefix "db2g".

- The first parameter into the function (*db2VersionNumber*) represents the version, release, or PTF level to which the code is to be compiled. This version number is used to specify the level of the structure that is passed in as the second parameter.
- The second parameter into the function is a void pointer to the primary interface structure for the API. Each element in the structure is either an atomic type (for example, db2Long32) or a pointer. Each parameter name adheres to the following naming conventions:

```
piCamelCase  - pointer to input data
poCamelCase  - pointer to output data
pioCamelCase - pointer to input or output data
iCamelCase   - integral input data
ioCamelCase  - integral input/output data
oCamelCase   - integral output data area
```

- The third parameter is a pointer to the SQLCA, and is mandatory.

Generic API Syntax

The syntax of the API call for the COBOL and FORTRAN programming languages.

Attention: Provide one extra byte for every character string passed to an API. Failure to do so may cause unexpected errors. This extra byte is modified by the database manager.

API Parameters

A description of each API parameter and its values. Predefined values are listed with the appropriate symbolics. Actual values for symbolics can be obtained from the appropriate language include files. COBOL programmers should substitute a hyphen (-) for the underscore (_) in all symbolics. For more information about parameter data types in each host language, see the sample programs.

Note: Applications calling database manager APIs must properly check for error conditions by examining return codes and the SQLCA structure. Most database manager APIs return a zero return code when successful. In general, a non-zero return code indicates that the secondary error handling mechanism, the SQLCA structure, may be corrupt. In this case, the called API is not executed. A possible cause for a corrupt SQLCA structure is passing an invalid address for the structure.

Error information is returned in the SQLCODE and SQLSTATE fields of the SQLCA structure, which is updated after most database manager API calls. Source files calling database manager APIs can provide one or more SQLCA structures; their names are arbitrary. An SQLCODE value of zero means successful execution (with possible SQLWARN warning conditions). A positive value means that the statement was

successfully executed but with a warning, as with truncation of a host variable. A negative value means that an error condition occurred.

An additional field, SQLSTATE, contains a standardized error code that is consistent across other IBM database products, and across SQL92 compliant database managers. Use SQLSTATEs when concerned about portability, since SQLSTATEs are common across many database managers.

The SQLWARN field contains an array of warning indicators, even if SQLCODE is zero.

REXX API Syntax

The REXX syntax of the API call, where appropriate.

A new interface, SQLDB2, has been added to support calling APIs from REXX. The SQLDB2 interface was created to provide support in REXX for new or previously unsupported APIs that do not have any output other than the SQLCA. Invoking a command through the SQLDB2 interface is syntactically the same as invoking the command through the command line processor (CLP), except that the token `call db2` is replaced by `CALL SQLDB2`. Using the `CALL SQLDB2` from REXX has the following advantages over calling the CLP directly:

- The compound REXX variable SQLCA is set
- By default, all CLP output messages are turned off.

For more information about the SQLDB2 interface, see the *Application Development Guide*.

REXX API Parameters

A description of each REXX API parameter and its values, where appropriate.

Sample Programs

The location and the names of sample programs illustrating the use of the API in one or more supported languages (C, COBOL, FORTRAN, and REXX).

Usage Notes

Other information.

See Also

A cross-reference to related information.

db2AdminMsgWrite

Provides a mechanism for users and Replication to write information to `db2diag.log` and the Windows NT event log. In the case of DB2 Satellite Edition, messages are logged to the notification files instead of the Windows NT event log.

This API is available on Windows NT, Windows 98, and Windows 95 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2AdminMsgWrite */
/* ... */
SQL_API_RC  SQL_API_FN
  db2AdminMsgWrite (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);

typedef struct
{
  db2Uint32 iMsgType;
  db2Uint32 iComponent;
  db2Uint32 iFunction;
  db2Uint32 iProbeID;
  char * piData_title;
  void * piData;
  db2Uint32 iDataLen;
  db2Uint32 iError_type;
} db2AdminMsgWriteStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. A pointer to the *db2AdminMsgWriteStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iMsgType
Input. Specify the type of data to be logged. Valid values are `BINARY_MSG` for binary data, and `STRING_MSG` for string data.

iComponent
Input. Specify zero.

iFunction
Input. Specify zero.

iProbeID
Input. Specify the numeric probe point.

piData_title
Input. A pointer to the title string describing the data to be logged. Can be set to NULL if a title is not needed.

piData
Input. A pointer to the data to be logged. Can be set to NULL if data logging is not needed.

iDataLen
Input. The number of bytes of binary data to be used for logging if *iMsgType* is `BINARY_MSG`. Not used if *iMsgType* is `STRING_MSG`.

iError_type
Input. Valid values are:

```
DB2LOG_SEVERE_ERROR   (1) - Severe error has occurred
DB2LOG_ERROR          (2) - Error has occurred
DB2LOG_WARNING        (3) - Warning has occurred
DB2LOG_INFORMATION    (4) - Informational
```

Usage Notes

This API will log to notification files or to the Windows NT event log only if the specified error type is less than or equal to the value of the *notifylevel* database manager configuration parameter. It will log to `db2diag.log` only if the specified error type is less than or equal to the value of the *diaglevel* database manager configuration parameter.

db2AutoConfig

Allows application programs to access the Performance Configuration wizard in the Control Center. Detailed information about this wizard is provided through the online help facility within the Control Center.

Authorization

sysadm

Required Connection

Database

API Include File

db2AuCfg.h

C API Syntax

```
SQL_API_RC_SQL_API_FN
db2AutoConfig(
    db2Uint32   db2VersionNumber,
    void *  pAutoConfigInterface,
    struct sqlca *  pSqlca);

typedef struct {
    db2int32  iProductID;
    char  iProductVersion[DB2_SG_PROD_VERSION_SIZE];
    char  iDbAlias[SQL_ALIAS_SZ];
    db2int32  iApply;
    db2AutoConfigInput  iParams;
    db2AutoConfigOutput  oResult;
} db2AutoConfigInterface;

typedef struct {
   db2int32  token;
   db2int32  value;
} db2AutoConfigElement;

typedef struct {
   db2Uint32  numElements;
   db2AutoConfigElement *  pElements;
} db2AutoConfigArray;

typedef db2AutoConfigArray  db2AutoConfigInput;
typedef db2AutoConfigArray  db2AutoConfigDiags;

typedef struct {
   db2Uint32  numElements;
   struct sqlfupd *  pConfigs;
   void * pDataArea;
} db2ConfigValues;

typedef struct {
   db2ConfigValues  oOldDbValues;
   db2ConfigValues  oOldDbmValues;
```

```
   db2ConfigValues  oNewDbValues;
   db2ConfigValues  oNewDbmValues
   db2AutoConfigDiags  oDiagnostics;
} db2AutoConfigOutput;
```

API Parameters

db2VersionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pAutoConfigInterface*.

pAutoConfigInterface
Input. A pointer to the *db2AutoConfigInterface* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iProductID
Input. Specifies a unique product identifier. For valid Product ID values see the API Include File *db2AuCfg.h*.

iProductVersion
Input. A 16 byte string specifying the product version.

iDbAlias
Input. A string specifying a database alias.

iApply
Input. Updates the configuration automatically.

iParams
Input. Passes parameters into the wizard.

oResult
Output. Includes all results from the wizard.

Token Specifies the configuration value for both the input parameters and the output diagnostics.

Value Holds the data specified by the token.

numElements
The number of array elements.

pElements
A pointer to the element array.

db2AutoConfigDiags
Returns tokens and values for diagnostics and problem determination. The tokens identify the problems and the values state the recommendations when appropriate. For a list of tokens and values see the API Include File *db2AuCfg.h*.

pConfigs
A pointer to the SQLFUPD structure. For more information on this structure see "SQLFUPD" on page 499.

pDataArea
A pointer to the data area containing the values of the configuration.

oOldDbValues
Output. If the *iApply* value is true, this value represents the database configuration value prior to using the wizard. If the apply value is false, this is the current value.

oOldDbmValues
Output. If the *iApply* value is true, this value represents the database manager configuration value prior to using the wizard. If the apply value is false, this is the current value.

oNewDbValues
Output. If the *iApply* value is true, this value represents the current database configuration value. If the apply value is false, this is recommended value for wizard.

oNewDbmValues
Output. If the *iApply* value is true, this value represents the current database manager configuration value. If the apply value is false, this is recommended value for wizard.

oDiagnostics
Output. Includes diagnostics from the wizard.

Sample Programs

C \sqllib\samples\cpp\autoconf.sqc

Usage Notes

To free the memory allocated by **db2AutoConfg**, call "db2AutoConfigFreeMemory" on page 20.

See Also

"db2AutoConfigFreeMemory" on page 20

"sqlfudb - Update Database Configuration" on page 268

"sqlfusys - Update Database Manager Configuration" on page 272.

db2AutoConfigFreeMemory

Frees the memory allocated by **db2AutoConfig**.

Authorization

sysadm

Required Connection

Database

API Include File

db2AuCfg.h

C API Syntax

```
SQL_API_RC_SQL_API_FN
db2AutoConfigFreeMemory(
    db2Uint32  db2VersionNumber,
    void * pAutoConfigInterface,
    struct sqlca * pSqlca);
```

API Parameters

db2VersionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pAutoConfigInterface*.

pAutoConfigInterface
Input. A pointer to the *db2AutoConfigInterface* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C \sqllib\samples\cpp\autoconf.sqc

db2ConvMonStream

Converts the new, self-describing format for a single logical data element (for example, SQLM_ELM_DB2) to the corresponding pre-version 6 external monitor structure (for example, sqlm_db2). When upgrading API calls to use the post-version 5 stream, one must traverse the monitor data using the new stream format (for example, the user must find the SQLM_ELM_DB2 element). This portion of the stream can then be passed into the conversion API to get the associated pre-version 6 data.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2ConvMonStream */
/* ... */
int db2ConvMonStream (
  unsigned char version,
  db2ConvMonStreamData * data,
  struct sqlca * pSqlca);

typedef struct
{
  void * poTarget;
  sqlm_header_info * piSource;
  db2Uint32 iTargetType;
  db2Uint32 iTargetSize;
  db2Uint32 iSourceType
} db2ConvMonStreamData;
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, *data*.

data Input. A pointer to the *db2ConvMonStreamData* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

poTarget
Output. A pointer to the target monitor output structure (for example, sqlm_db2). A list of output types, and their corresponding input types, is given below.

piSource
Input. A pointer to the logical data element being converted (for example, SQLM_ELM_DB2). A list of output types, and their corresponding input types, is given below.

iTargetType
Input. The type of conversion being performed. Specify the value for the v5 type in `sqlmon.h` for instance SQLM_DB2_SS.

iTargetSize
Input. This parameter can usually be set to the size of the structure pointed to by *poTarget*; however, for elements that have usually been referenced by an offset value from the end of the structure (for example, statement text in *sqlm_stmt*), specify a buffer that is large enough to contain the sqlm_stmt statically-sized elements, as well as a statement of the largest size to be extracted; that is, `SQL_MAX_STMT_SZ` plus sizeof(sqlm_stmt).

iSourceType
Input. The type of source stream. Valid values are `SQLM_STREAM_SNAPSHOT` (snapshot stream), or `SQLM_STREAM_EVMON` (event monitor stream).

Usage Notes

Following is a list of supported convertible data elements:

Snapshot Variable Datastream Type	Structure
SQLM_ELM_APPL	sqlm_appl
SQLM_ELM_APPL_INFO	sqlm_applinfo
SQLM_ELM_DB2	sqlm_db2
SQLM_ELM_FCM	sqlm_fcm
SQLM_ELM_FCM_NODE	sqlm_fcm_node
SQLM_ELM_DBASE	sqlm_dbase
SQLM_ELM_TABLE_LIST	sqlm_table_header
SQLM_ELM_TABLE	sqlm_table
SQLM_ELM_DB_LOCK_LIST	sqlm_dbase_lock
SQLM_ELM_APPL_LOCK_LIST	sqlm_appl_lock
SQLM_ELM_LOCK	sqlm_lock
SQLM_ELM_STMT	sqlm_stmt
SQLM_ELM_SUBSECTION	sqlm_subsectiion
SQLM_ELM_TABLESPACE_LIST	sqlm_tablespace_header
SQLM_ELM_TABLESPACE	sqlm_tablespace
SQLM_ELM_ROLLFORWARD	sqlm_rollfwd_info
SQLM_ELM_BUFFERPOOL	sqlm_bufferpool
SQLM_ELM_LOCK_WAIT	sqlm_lockwait
SQLM_ELM_DCS_APPL	sqlm_dcs_appl, sqlm_dcs_applid_info, sqlm_dcs_appl_snap_stats,

	sqlm_xid, sqlm_tpmon
SQLM_ELM_DCS_DBASE	sqlm_dcs_dbase
SQLM_ELM_DCS_APPL_INFO	sqlm_dcs_applid_info
SQLM_ELM_DCS_STMT	sqlm_dcs_stmt
SQLM_ELM_COLLECTED	sqlm_collected

Event Monitor Variable Datastream Type	Structure
SQLM_ELM_EVENT_DB	sqlm_db_event
SQLM_ELM_EVENT_CONN	sqlm_conn_event
SQLM_ELM_EVENT_TABLE	sqlm_table_event
SQLM_ELM_EVENT_STMT	sqlm_stmt_event
SQLM_ELM_EVENT_XACT	sqlm_xaction_event
SQLM_ELM_EVENT_DEADLOCK	sqlm_deadlock_event
SQLM_ELM_EVENT_DLCONN	sqlm_dlconn_event
SQLM_ELM_EVENT_TABLESPACE	sqlm_tablespace_event
SQLM_ELM_EVENT_DBHEADER	sqlm_dbheader_event
SQLM_ELM_EVENT_START	sqlm_evmon_start_event
SQLM_ELM_EVENT_CONNHEADER	sqlm_connheader_event
SQLM_ELM_EVENT_OVERFLOW	sqlm_overflow_event
SQLM_ELM_EVENT_BUFFERPOOL	sqlm_bufferpool_event
SQLM_ELM_EVENT_SUBSECTION	sqlm_subsection_event
SQLM_ELM_EVENT_LOG_HEADER	sqlm_event_log_header

The *sqlm_rollfwd_ts_info* structure is not converted; it only contains a table space name that can be accessed directly from the stream. The *sqlm_agent* structure is also not converted; it only contains the *pid* of the agent, which can also be accessed directly from the stream.

db2DatabaseRestart - Restart Database

Restarts a database that has been abnormally terminated and left in an inconsistent state. At the successful completion of this API, the application remains connected to the database if the user has CONNECT privilege.

Scope

This API affects only the node on which it is executed.

Authorization

None

Required Connection

This API establishes a database connection.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Restart Database */
/* ... */
SQL_API_RC SQL_API_FN
  db2DatabaseRestart (
    db2Uint32 versionNumber;
    void * pParamStruct;
    struct sqlca * pSqlca);

typedef struct
{
  char * piDatabaseName;
  char * piUserId;
  char * piPassword;
  char * piTablespaceNames;
} db2RestartDbStruct;
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Restart Database */
/* ... */
SQL_API_RC SQL_API_FN
  db2DatabaseRestart (
    db2Uint32 versionNumber;
    void * pParamStruct;
    struct sqlca * pSqlca);

typedef struct
{
  char * piDatabaseName;
  char * piUserId;
  char * piPassword;
  char * piTablespaceNames;
} db2RestartDbStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2RestartDbStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piDatabaseName
Input. A pointer to a string containing the alias of the database that is to be restarted.

piUserId
Input. A pointer to a string containing the user name of the application. May be NULL.

piPassword
Input. A pointer to a string containing a password for the specified user name (if any). May be NULL.

piTablespaceNames
Input. A pointer to a string containing a list of table space names to be dropped during the restart operation. May be NULL.

REXX API Syntax

```
RESTART DATABASE database_alias [USER username USING password]
```

REXX API Parameters

database_alias
Alias of the database to be restarted.

username
User name under which the database is to be restarted.

password
Password used to authenticate the user name.

Usage Notes

Call this API if an attempt to connect to a database returns an error message, indicating that the database must be restarted. This action occurs only if the previous session with this database terminated abnormally (due to power failure, for example).

At the completion of this API, a shared connection to the database is maintained if the user has CONNECT privilege, and an SQL warning is issued if any indoubt transactions exist. In this case, the database is still usable, but if the indoubt transactions are not resolved before the last connection to the database is dropped, another call to the API must be completed before the database can be used again. Use the transaction APIs (see "Appendix B. Transaction APIs" on page 543) to generate a list of indoubt transactions. For more information about indoubt transactions, see the *Administration Guide*.

In the case of circular logging, a database restart operation will fail if there is any problem with the table spaces, such as an I/O error, an unmounted file system, and so on. If losing such table spaces is not an issue, their names can be explicitly specified; this will put them into drop pending state, and the restart operation can complete successfully.

See Also

CONNECT TO statement in the *SQL Reference*.

db2GetSnapshot - Get Snapshot

Collects database manager monitor information and returns it to a user-allocated data buffer. The information returned represents a *snapshot* of the database manager operational status at the time the API was called.

Scope

This API returns information only for the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. If there is no instance attachment, a default instance attachment is created.

To obtain a snapshot from a remote instance (or a different local instance), it is necessary to first attach to that instance.

API Include File

db2ApiDf.h

C API Syntax

```
int db2GetSnapshot( unsigned char version;
db2GetSnapshotData *data,
struct sqlca  *sqlca;

The parameters described in data are:
typedef struct db2GetSnapshotData{
  sqlma  *piSqlmaData;
  sqlm_collected  *poCollectedData
  void  *poBuffer;
  db2uint32 iVersion;
  db2int32 iBufferSize;
  db2uint8 iStoreResult;
db2uint16 iNodeNumber;
db2uint32 *poOutputFormat;

}db2GetSnapshotData;
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, data.

data Input/Output. A pointer to the *db2GetSnapshotData* structure.

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piSqlmaData

Input. Pointer to the user-allocated *sqlma* (monitor area) structure. This structure specifies the type(s) of data to be collected. For more information, see "SQLMA" on page 512.

poCollectedData

Output. A pointer to the *sqlm_collected* structure into which the database monitor delivers summary statistics and the number of each type of data structure returned in the buffer area. For more information about this structure, see "SQLM-COLLECTED" on page 507.

Note: This structure is only used for pre-Version 6 data streams. However, if a snapshot call is made to a back-level remote server, this structure must be passed in for results to be processed. It is therefore recommended that this parameter always be passed in.

poBuffer

Output. Pointer to the user-defined data area into which the snapshot information will be returned. For information about interpreting the data returned in this buffer, see the *System Monitor Guide and Reference*.

iVersion

Input. Version ID of the database monitor data to collect. The database monitor only returns data that was available for the requested version. Set this parameter to one of the following symbolic constants:

- `SQLM_DBMON_VERSION1`
- `SQLM_DBMON_VERSION2`
- `SQLM_DBMON_VERSION5`
- `SQLM_DBMON_VERSION5_2`
- `SQLM_DBMON_VERSION6`
- `SQLM_DBMON_VERSION7`

Note: If `SQLM_DBMON_VERSION1` is specified as the version, the APIs cannot be run remotely.

iBufferSize

Input. The length of the data buffer. Use "db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer" on page 30 to estimate the size of this buffer. If the buffer is not large

enough, a warning is returned, along with the information that will fit in the assigned buffer. It may be necessary to resize the buffer and call the API again.

iStoreResult
Input. An indicator set to TRUE or FALSE, depending on whether the snapshot results are to be stored at the DB2 server for viewing through SQL. This parameter should only be set to TRUE when the snapshot is being taken over a database connection, and when one of the snapshot types in the *sqlma* is SQLMA_DYNAMIC_SQL.

iNodeNumber
Input. The node where the request is to be sent. Based on this value, the request will be processed for the current node, all nodes or a user specified node. Valid values are:

- SQLM_CURRENT_NODE
- SQLM_ALL_NODES
- *node value*

Note: For standalone instances SQLM_CURRENT_NODE must be used.

poOutputFormat
The format of the stream returned by the server. It will be one of the following:

- SQLM_STREAM_STATIC_FORMAT
- SQLM_STREAM_DYNAMIC_FORMAT

Usage Notes

If an alias for a database residing at a different instance is specified, an error message is returned.

For detailed information about the use of the database monitor APIs, and for a summary of all database monitor data elements and monitoring groups, see the *System Monitor Guide and Reference*.

See Also

"db2ConvMonStream" on page 21

"db2MonitorSwitches - Get/Update Monitor Switches" on page 69

"db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer" on page 30

"db2ResetMonitor - Reset Monitor" on page 78.

db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer

Estimates the buffer size needed by "db2GetSnapshot - Get Snapshot" on page 27.

Scope

This API only affects the instance to which the calling application is attached.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. If there is no instance attachment, a default instance attachment is created.

To obtain information from a remote instance (or a different local instance), it is necessary to first attach to that instance. If an attachment does not exist, an implicit instance attachment is made to the node specified by the **DB2INSTANCE** environment variable.

API Include File

db2ApiDf.h

C API Syntax

```
int db2GetSnapshotSize(db2Uint32 version,
    void*  pParamStruct,
    struct sqlca* sqlca);

typedef struct
{
        struct sqlma                    *piSqlmaData;
        sqluint32                       *poBufferSize;
        db2Uint32                       iVersion;
        db2int32                        iNodeNumber;
}db2GetSnapshotSizeData;
/* ...*/
```

API Parameters

version
Input. Specifies the version and release level of the structure passed as the second parameter pParamStruct.

pParamStruct
Input. A pointer to the *db2GetSnapshotSizeStruct* structure.

sqlca Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piSqlmaData
Input. Pointer to the user-allocated *sqlma* (monitor area) structure. This structure specifies the type(s) of snapshot data to be collected, and can be reused as input to "db2GetSnapshot - Get Snapshot" on page 27. For more information about this structure, see "SQLMA" on page 512.

poBufferSize
Output. A pointer to the returned estimated buffer size needed by the GET SNAPSHOT API.

iVersion
Input. Version ID of the database monitor data to collect. The database monitor only returns data that was available for the requested version. Set this parameter to one of the following symbolic constants:

- `SQLM_DBMON_VERSION1`
- `SQLM_DBMON_VERSION2`
- `SQLM_DBMON_VERSION5`
- `SQLM_DBMON_VERSION5_2`
- `SQLM_DBMON_VERSION6`
- `SQLM_DBMON_VERSION7`

Note: If `SQLM_DBMON_VERSION1` is specified as the version, the APIs cannot be run remotely.

iNodeNumber
Input. The node where the request is to be sent. Based on this value, the request will be processed for the current node, all nodes or a user specified node. Valid values are:

- `SQLM_CURRENT_NODE`
- `SQLM_ALL_NODES`
- *`node value`*

Note: For stand-alone instances `SQLM_CURRENT_NODE` must be used.

Usage Notes

This function generates a significant amount of overhead. Allocating and freeing memory dynamically for each **db2GetSnapshot** call is also expensive. If calling **db2GetSnapshot** repeatedly, for example, when sampling data over a period of time, it may be preferable to allocate a buffer of fixed size, rather than call **db2GetSnapshotSize**.

If the database system monitor finds no active databases or applications, it may return a buffer size of zero (if, for example, lock information related to a

database that is not active is requested). Verify that the estimated buffer size returned by this API is non-zero before calling "db2GetSnapshot - Get Snapshot" on page 27. If an error is returned by **db2GetSnapshot** because of insufficient buffer space to hold the output, call this API again to determine the new size requirements.

For detailed information about the use of the database monitor APIs, and for a summary of all database monitor data elements and monitoring groups, see the *System Monitor Guide and Reference*.

See Also

"db2MonitorSwitches - Get/Update Monitor Switches" on page 69

"db2GetSnapshot - Get Snapshot" on page 27

"db2ResetMonitor - Reset Monitor" on page 78.

db2GetSyncSession

Gets the satellite's current synchronization session identifier.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2GetSyncSession */
/* ... */
SQL_API_RC SQL_API_FN
  db2db2GetSyncSession (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * poSyncSessionID;
} db2GetSyncSessionStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. A pointer to the *db2GetSyncSessionStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

poSyncSessionID
Output. Specifies an identifier for the synchronization session that a satellite is currently using.

db2HistoryCloseScan - Close Recovery History File Scan

Ends a recovery history file scan and frees DB2 resources required for the scan. This API must be preceded by a successful call to "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

Authorization

None

Required Connection

Instance. It is not necessary to call ATTACH before calling this API.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Close Recovery History File Scan */
/* ... */
SQL_API_RC  SQL_API_FN
  db2HistoryCloseScan (
    db2Uint32 version,
    void * piHandle,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Close Recovery History File Scan */
/* ... */
SQL_API_RC  SQL_API_FN
  db2GenHistoryCloseScan (
    db2Uint32 version,
    void * piHandle,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the second parameter, *piHandle*.

piHandle
Input. Specifies a pointer to the handle for scan access that was returned by "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
CLOSE RECOVERY HISTORY FILE :scanid
```

REXX API Parameters

scanid Host variable containing the scan identifier returned from OPEN RECOVERY HISTORY FILE SCAN.

Usage Notes

For a detailed description of the use of the recovery history file APIs, see "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

See Also

"db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36

"db2HistoryOpenScan - Open Recovery History File Scan" on page 39

"db2Prune" on page 72

"db2HistoryUpdate - Update Recovery History File" on page 44.

db2HistoryGetEntry - Get Next Recovery History File Entry

Gets the next entry from the recovery history file. This API must be preceded by a successful call to "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

Authorization

None

Required Connection

Instance. It is not necessary to call **sqleatin** before calling this API.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Get Next Recovery History File Entry */
/* ... */
SQL_API_RC SQL_API_FN
  db2HistoryGetEntry (
    db2Uint32 version,
    void * pDB2HistoryGetEntryStruct,
    struct sqlca * pSqlca);

typedef struct
{
  db2Uint16 iHandle,
  db2Uint16 iCallerAction,
  struct db2HistData * pioHistData
} db2HistoryGetEntryStruct;
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Get Next Recovery History File Entry */
/* ... */
SQL_API_RC SQL_API_FN
  db2GenHistoryGetEntry (
    db2Uint32 version,
    void * pDB2GenHistoryGetEntryStruct,
    struct sqlca * pSqlca);

typedef struct
{
  db2Uint16 iHandle,
  db2Uint16 iCallerAction,
  struct db2HistData * pioHistData
} db2GenHistoryGetEntryStruct;
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, *pDB2HistoryGetEntryStruct*.

pDB2HistoryGetEntryStruct
Input. A pointer to the *db2HistoryGetEntryStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iHandle
Input. Contains the handle for scan access that was returned by "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

iCallerAction
Input. Specifies the type of action to be taken. Valid values (defined in `db2ApiDf`) are:

DB2HISTORY_GET_ENTRY
Get the next entry, but without any command data.

DB2HISTORY_GET_DDL
Get only the command data from the previous fetch.

DB2HISTORY_GET_ALL
Get the next entry, including all data.

pioHistData
Input. A pointer to the *db2HistData* structure. For more information about this structure, see "db2HistData" on page 423.

REXX API Syntax

```
GET RECOVERY HISTORY FILE ENTRY :scanid [USING :value]
```

REXX API Parameters

scanid Host variable containing the scan identifier returned from OPEN RECOVERY HISTORY FILE SCAN.

value A compound REXX host variable into which the recovery history file entry information is returned. In the following, XXX represents the host variable name:

XXX.0	Number of first level elements in the variable (always 15)
XXX.1	Number of table space elements

XXX.2	Number of used table space elements
XXX.3	OPERATION (type of operation performed)
XXX.4	OBJECT (granularity of the operation)
XXX.5	OBJECT_PART (time stamp and sequence number)
XXX.6	OPTYPE (qualifier of the operation)
XXX.7	DEVICE_TYPE (type of device used)
XXX.8	FIRST_LOG (earliest log ID)
XXX.9	LAST_LOG (current log ID)
XXX.10	BACKUP_ID (identifier for the backup)
XXX.11	SCHEMA (qualifier for the table name)
XXX.12	TABLE_NAME (name of the loaded table)
XXX.13.0	NUM_OF_TABLESPACES (number of table spaces involved in backup or restore)
XXX.13.1	Name of the first table space backed up/restored
XXX.13.2	Name of the second table space backed up/restored
XXX.13.3	and so on
XXX.14	LOCATION (where backup or copy is stored)
XXX.15	COMMENT (text to describe the entry).

Usage Notes

The records that are returned will have been selected using the values specified on the call to "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

For a detailed description of the use of the recovery history file APIs, see "db2HistoryOpenScan - Open Recovery History File Scan" on page 39.

See Also

"db2HistoryCloseScan - Close Recovery History File Scan" on page 34

"db2HistoryOpenScan - Open Recovery History File Scan" on page 39

"db2Prune" on page 72

"db2HistoryUpdate - Update Recovery History File" on page 44.

db2HistoryOpenScan - Open Recovery History File Scan

Starts a recovery history file scan.

Authorization

None

Required Connection

Instance. It is not necessary to call ATTACH before calling this API. If the database is cataloged as remote, an instance attachment to the remote node is established.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Open Recovery History File Scan */
/* ... */
SQL_API_RC SQL_API_FN
  db2HistoryOpenScan (
    db2Uint32 version,
    void * pDB2HistoryOpenStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piDatabaseAlias,
  char * piTimestamp,
  char * piObjectName,
  db2Uint32 oNumRows,
  db2Uint16 iCallerAction,
  db2Uint16 oHandle
} db2HistoryOpenStruct;
/* ... */
```

db2HistoryOpenScan - Open Recovery History File Scan

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Open Recovery History File Scan */
/* ... */
SQL_API_RC SQL_API_FN
  db2GenHistoryOpenScan (
    db2Uint32 version,
    void * pDB2GenHistoryOpenStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piDatabaseAlias,
  char * piTimestamp,
  char * piObjectName,
  db2Uint32 oNumRows,
  db2Uint16 iCallerAction,
  db2Uint16 oHandle
} db2GenHistoryOpenStruct;
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, *pDB2HistoryOpenStruct*.

pDB2HistoryOpenStruct
Input. A pointer to the *db2HistoryOpenStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piDatabaseAlias
Input. A pointer to a string containing the database alias.

piTimestamp
Input. A pointer to a string specifying the time stamp to be used for selecting records. Records whose time stamp is equal to or greater than this value are selected. Setting this parameter to NULL, or pointing to zero, prevents the filtering of entries using a time stamp.

piObjectName
Input. A pointer to a string specifying the object name to be used for selecting records. The object may be a table or a table space. If it is a table, the fully qualified table name must be provided. Setting this parameter to NULL, or pointing to zero, prevents the filtering of entries using the object name.

oNumRows
Output. Upon return from the API, this parameter contains the number of matching recovery history file entries.

iCallerAction
Input. Specifies the type of action to be taken. Valid values (defined in `db2ApiDf`) are:

DB2HISTORY_LIST_HISTORY
Select all of the records (backup, restore, and load) that pass the other filters.

DB2HISTORY_LIST_BACKUP
Select only the backup and restore records that pass the other filters.

DB2HISTORY_LIST_ROLLFORWARD
Select only the roll forward records that pass the other filters.

DB2HISTORY_LIST_RUNSTATS
Select only the RUNSTATS records that pass the other filters.

Note: This value is not currently supported.

DB2HISTORY_LIST_REORG
Select only the reorganize table records that pass the other filters.

Note: This value is not currently supported.

DB2HISTORY_LIST_ALT_TABLESPACE
Select only the ALTER TABLESPACE records that pass the other filters. The DDL field associated with an entry will not be returned. To retrieve the DDL information for an entry, "db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36 must be called with a caller action of `DB2HISTORY_GET_DDL` immediately after the entry is fetched.

DB2HISTORY_LIST_DROPPED_TABLE
Select only the dropped table records that pass the other filters. The DDL field associated with an entry will not be returned. To retrieve the DDL information for an entry, "db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36 must be called with a caller action of `DB2HISTORY_GET_DDL` immediately after the entry is fetched.

DB2HISTORY_LIST_LOAD
Select only the load records that pass the other filters.

DB2HISTORY_LIST_REN_TABLESPACE
Select only the rename tablespace records that pass the other filters.

oHandle
Output. Upon return from the API, this parameter contains the handle for scan access. It is subsequently used in "db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36, and "db2HistoryCloseScan - Close Recovery History File Scan" on page 34.

REXX API Syntax

```
OPEN [BACKUP] RECOVERY HISTORY FILE FOR database_alias
[OBJECT objname] [TIMESTAMP :timestamp]
USING :value
```

REXX API Parameters

database_alias
The alias of the database whose history file is to be listed.

objname
Specifies the object name to be used for selecting records. The object may be a table or a table space. If it is a table, the fully qualified table name must be provided. Setting this parameter to NULL prevents the filtering of entries using *objname*.

timestamp
Specifies the time stamp to be used for selecting records. Records whose time stamp is equal to or greater than this value are selected. Setting this parameter to NULL prevents the filtering of entries using *timestamp*.

value A compound REXX host variable to which recovery history file information is returned. In the following, XXX represents the host variable name.

XXX.0 Number of elements in the variable (always 2)

XXX.1 Identifier (handle) for future scan access

XXX.2 Number of matching recovery history file entries.

Usage Notes

The combination of time stamp, object name and caller action can be used to filter records. Only records that pass all specified filters are returned.

The filtering effect of the object name depends on the value specified:

- Specifying a table will return records for load operations, because this is the only information for tables in the history file.

- Specifying a table space will return records for backups, restore operations, and load operations for the table space.

Note: To return records for tables, they must be specified as *schema.tablename*. Specifying *tablename* will only return records for table spaces.

A maximum of eight history file scans per process is permitted.

To list every entry in the history file, a typical application will perform the following steps:

1. Call **db2HistoryOpenScan**, which will return *oNumRows*.
2. Allocate an *db2HistData* structure with space for *n oTablespace* fields, where *n* is an arbitrary number.
3. Set the *iDB2NumTablespace* field of the *db2HistData* structure to *n*.
4. In a loop, perform the following:
   - Call **db2HistoryGetEntry** to fetch from the history file.
   - If **db2HistoryGetEntry** returns an SQLCODE of `SQL_RC_OK`, use the *sqld* field of the *db2HistData* structure to determine the number of table space entries returned.
   - If **db2HistoryGetEntry** returns an SQLCODE of `SQLUH_SQLUHINFO_VARS_WARNING`, not enough space has been allocated for all of the table spaces that DB2 is trying to return; free and reallocate the *db2HistData* structure with enough space for *oDB2UsedTablespace* table space entries, and set *iDB2NumTablespace* to *oDB2UsedTablespace*.
   - If **db2HistoryGetEntry** returns an SQLCODE of `SQLE_RC_NOMORE`, all recovery history file entries have been retrieved.
   - Any other SQLCODE indicates a problem.
5. When all of the information has been fetched, call "db2HistoryCloseScan - Close Recovery History File Scan" on page 34 to free the resources allocated by the call to **db2HistoryOpenScan**.

The macro SQLUHINFOSIZE(*n*), defined in `sqlutil`, is provided to help determine how much memory is required for an *db2HistData* structure with space for *n oTablespace* fields.

See Also

"db2HistoryCloseScan - Close Recovery History File Scan" on page 34

"db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36

"db2Prune" on page 72

"db2HistoryUpdate - Update Recovery History File" on page 44.

db2HistoryUpdate - Update Recovery History File

Updates the location, device type, or comment in a history file entry.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*

Required Connection

Database. To update entries in the history file for a database other than the default database, a connection to the database must be established before calling this API.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Update Recovery History File */
/* ... */
SQL_API_RC SQL_API_FN
  db2HistoryUpdate (
    db2Uint32 version,
    void * pDB2HistoryUpdateStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piNewLocation,
  char * piNewDeviceType,
  char * piNewComment,
  db2Uint32 iEID
} db2HistoryUpdateStruct;
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Update Recovery History File */
/* ... */
SQL_API_RC SQL_API_FN
  db2GenHistoryUpdate (
    db2Uint32 version,
    void * pDB2GenHistoryUpdateStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piNewLocation,
  char * piNewDeviceType,
  char * piNewComment,
  db2Uint32 iEID
} db2GenHistoryUpdateStruct;
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, *pDB2HistoryUpdateStruct*.

pDB2HistoryUpdateStruct
Input. A pointer to the *db2HistoryUpdateStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piNewLocation
Input. A pointer to a string specifying a new location for the backup, restore, or load copy image. Setting this parameter to NULL, or pointing to zero, leaves the value unchanged.

piNewDeviceType
Input. A pointer to a string specifying a new device type for storing the backup, restore, or load copy image. Setting this parameter to NULL, or pointing to zero, leaves the value unchanged.

piNewComment
Input. A pointer to a string specifying a new comment to describe the entry. Setting this parameter to NULL, or pointing to zero, leaves the comment unchanged.

iEID Input. A unique identifier that can be used to update a specific entry in the history file.

REXX API Syntax

```
UPDATE RECOVERY HISTORY USING :value
```

REXX API Parameters

value A compound REXX host variable containing information pertaining to the new location of a recovery history file entry. In the following, XXX represents the host variable name:

XXX.0 Number of elements in the variable (must be between 1 and 4)

XXX.1 OBJECT_PART (time stamp with a sequence number from 001 to 999)

XXX.2 New location for the backup or copy image (this parameter is optional)

XXX.3 New device used to store the backup or copy image (this parameter is optional)

XXX.4 New comment (this parameter is optional).

Usage Notes

This is an update function, and all information prior to the change is replaced and cannot be recreated. These changes are not logged.

The history file is used for recording purposes only. It is not used directly by the restore or the roll-forward functions. During a restore operation, the location of the backup image can be specified, and the history file is useful for tracking this location. The information can subsequently be provided to "sqlubkp - Backup Database" on page 290. Similarly, if the location of a load copy image is moved, the rollforward utility must be provided with the new location and type of storage media. For additional information, see the *Administration Guide* and "sqluroll - Rollforward Database" on page 397.

See Also

"db2HistoryCloseScan - Close Recovery History File Scan" on page 34

"db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36

"db2HistoryOpenScan - Open Recovery History File Scan" on page 39

"db2Prune" on page 72.

db2LdapCatalogDatabase

Catalogs a database entry in LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapCatalogDatabase */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapCatalogDatabase(
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
 char * piAlias;
 char * piDatabaseName;
 char * piComment
 char * piNodeName;
 char * piGWNodeName;
 char * piParameters;
 char * piARLibrary;
 unsigned short iAuthentication;
 char * piDCEPrincipalName;
 char * piBindDN;
 char * piPassword;
} db2LdapCatalogDatabaseStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapCatalogDatabaseStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piAlias
Input. Specify an alias to be used as an alternate name for the database being cataloged. If an alias is not specified, the database manager uses the database name as the alias name.

piDatabaseName
Input. Specify the name of the database to catalog. This parameter is mandatory.

piComment
Input. Describes the DB2 server. Any comment that helps to describe the server registered in the network directory can be entered. Maximum length is 30 characters. A carriage return or a line feed character is not permitted.

piNodeName
Input. Specify the node name of the database server on which the database resides. This parameter is required if the database resides on a remote database server.

piGWNodename
Input. Specify the node name of the DB2 Connect gateway server. If the database server node type is DCS (reserved for host database servers), and the client does not have DB2 Connect installed, the client will connect to the DB2 Connect gateway server.

piParameters
Input. Specify a parameter string that is to be passed to the application requestor (AR). For an explanation of what format DB2 Connect expects for this string, see the *DB2 Connect User's Guide*. Authentication DCE is not supported.

piARLibrary
Input. Specify the name of the application requester (AR) library. For more information, see the *DB2 Connect User's Guide*.

iAuthentication
Input. Specifying an authentication type can result in a performance benefit. For more information about authentication types, see the *Administration Guide*.

piDCEPrincipalName
Input. Specify the fully qualified DCE principal name for the target server.

piBindDN
Input. Specify the user's LDAP distinguished name (DN). The LDAP

user DN must have sufficient authority to create and update the object in the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword
Input. Account password.

Usage Notes

A database may need to be manually registered or cataloged in LDAP if:

- The database server does not support LDAP. In this case, the administrator needs to manually register each database in LDAP to allow clients that support LDAP to access the database without having to catalog the database locally on each client machine.
- The application wants to use a different name to connect to the database. In this case, the administrator needs to catalog the database using a different alias name.
- During CREATE DATABASE IN LDAP, the database name already exists in LDAP. The database is still created on the local machine (and can be accessed by local applications), but the existing entry in LDAP will not be modified to reflect the new database. In this case, the administrator can:
  - Remove the existing database entry from LDAP, and manually register the new database in LDAP.
  - Register the new database in LDAP using a different alias name.

db2LdapCatalogNode

Specifies an alternate name for the node entry in LDAP (Lightweight Directory Access Protocol), or a different protocol type for connecting to the database server.

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapCatalogNode */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapCatalogNode(
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piAlias;
  char * piNodeName;
  char * piBindDN;
  char * piPassword;
} db2LdapCatalogNodeStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapCatalogNodeStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piAlias
Input. Specify a new alias to be used as an alternate name for the node entry.

piNodeName
Input. Specify a node name that represents the DB2 server in LDAP.

piBindDN
Input. Specify the user's LDAP distinguished name (DN). The LDAP user DN must have sufficient authority to create and update the object in the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword
Input. Account password.

db2LdapDeregister

Deregisters the DB2 server from LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapDeregister */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapDeregister (
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piNodeName;
  char * piBindDN;
  char * piPassword;
} db2LdapDeregisterStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapDeregisterStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piNodeName
Input. Specify a short name that represents the DB2 server in LDAP.

piBindDN

Input. Specify the user's LDAP distinguished name (DN). The LDAP user DN must have sufficient authority to delete the object from the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword

Input. Account password.

db2LdapRegister

Registers the DB2 server in LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapRegister */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapRegister (
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piNodeName;
  char * piComputer;
  char * piInstance;
  unsigned short iNodeType;
  db2LdapProtocolInfo iProtocol;
  char * piComment;
  char * piBindDN;
  char * piPassword;
} db2LdapRegisterStruct;

typedef struct
{
  char iType;
  char * piHostName;
  char * piServiceName;
  char * piNetbiosName;
  char * piNetworkId;
  char * piPartnerLU;
  char * piTPName;
  char * piMode;
  unsigned short iSecurityType;
  char * piLanAdapterAddress;
```

```
  char * piChangePasswordLU;
  char * piIpxAddress;
} db2LdapProtocolInfo;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapRegisterStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piNodeName
Input. Specify a short name (less than 8 characters) that represents the DB2 server in LDAP.

piComputer
Input. Specify the name of the computer system on which the DB2 server resides. The computer name value must be the same as the value specified when adding the server machine to LDAP. On Windows NT, this is the NT computer name. On UNIX based systems, this is the TCP/IP host name. On OS/2, this is the value specified for the **DB2SYSTEM** registry variable. Specify NULL to register the DB2 server on the local computer.

piInstance
Input. Specify the instance name of the DB2 server. The instance name must be specified if the computer name is specified to register a remote server. Specify NULL to register the current instance (as defined by the **DB2SYSTEM** environment variable).

iNodeType
Input. Specify the node type for the database server. Valid values are:

```
SQLF_NT_SERVER
SQLF_NT_MPP
SQLF_NT_DCS
```

iProtocol
Input. Specify the protocol information in the *db2LdapProtocolInfo* structure.

piComment
Input. Describes the DB2 server. Any comment that helps to describe the server registered in the network directory can be entered. Maximum length is 30 characters. A carriage return or a line feed character is not permitted.

piBindDN
Input. Specify the user's LDAP distinguished name (DN). The LDAP user DN must have sufficient authority to create and update the object in the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword
Input. Account password.

iType Input. Specify the protocol type that this server supports. If the server supports more than one protocol, multiple registrations (each with a different node name and protocol type) are required. Valid values are:

```
SQL_PROTOCOL_APPN   - For APPC/APPN support
SQL_PROTOCOL_NETB   - For NetBIOS support
SQL_PROTOCOL_TCPIP  - For TCP/IP support
SQL_PROTOCOL_SOCKS  - For TCP/IP with socket security
SQL_PROTOCOL_IPXSPX - For IPX/SPX support
SQL_PROTOCOL_NPIPE  - For Windows NT Named Pipe support
```

piHostName
Input. Specify the TCP/IP host name or the IP address.

piServiceName
Input. Specify the TCP/IP service name or port number.

piNetbiosName
Input. Specify the NetBIOS workstation name. The NetBIOS name must be specified for NetBIOS support.

piNetworkID
Input. Specify the network ID. The network ID must be specified for APPC/APPN support.

piPartnerLU
Input. Specify the partner LU name for the DB2 server machine. The partner LU must be specified for APPC/APPN support.

piTPName
Input. Specify the transaction program name. The transaction program name must be specified for APPC/APPN support.

piMode
Input. Specify the mode name. The mode must be specified for APPC/APPN support.

iSecurityType
Input. Specify the APPC security level. Valid values are:

```
SQL_CPIC_SECURITY_NONE (default)
SQL_CPIC_SECURITY_SAME
SQL_CPIC_SECURITY_PROGRAM
```

piLanAdapterAddress
Input. Specify the network adapter address. This parameter is only required for APPC support. For APPN, this parameter can be set to NULL.

piChangePasswordLU
Input. Specify the name of the partner LU to use when changing the password for the host database server.

piIpxAddress
Input. Specify the complete IPX address. The IPX address must be specified for IPX/SPX support.

Usage Notes

Register the DB2 server once for each protocol that the server supports each time specifying a unique node name.

If any protocol configuration parameter is specified when registering a DB2 server locally, it will override the value specified in the database manager configuration file.

Only a remote DB2 server can be registered in LDAP. The computer name and the instance name of the remote server must be specified, along with the protocol communication for the remote server.

When registering a host database server, a value of `SQLF_NT_DCS` must be specified for the *iNodeType* parameter.

db2LdapUncatalogDatabase

Removes a database entry from LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapUncatalogDatabase */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapUncatalogDatabase(
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piAlias[SQL_ALIAS_SZ];
  char * piBindDN;
  char * piPassword;
} db2LdapUncatalogDatabaseStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapUncatalogDatabaseStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piAlias
Input. Specify an alias name for the database entry. This parameter is mandatory.

piBindDN

Input. Specify the user's LDAP distinguished name (DN). The LDAP user DN must have sufficient authority to delete the object from the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword

Input. Account password.

db2LdapUncatalogNode

Removes a node entry from LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapUncatalogNode */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapUncatalogNode(
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piAlias;
  char * piBindDN;
  char * piPassword;
} db2LdapUncatalogNodeStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParamStruct
Input. A pointer to the *db2LdapUncatalogNodeStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piAlias
Input. Specify the alias of the node to uncatalog from LDAP.

piBindDN
Input. Specify the user's LDAP distinguished name (DN). The LDAP

user DN must have sufficient authority to delete the object from the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword
Input. Account password.

db2LdapUpdate

Updates the communication protocol information for the DB2 server in LDAP (Lightweight Directory Access Protocol).

This API is available on Windows NT, Windows 98, Windows 95, and Windows 2000 only.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2LdapUpdate */
/* ... */
SQL_API_RC SQL_API_FN
  db2LdapUpdate (
    sqlint32 versionNumber,
    void * pParamStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piNodeName;
  char * piComment;
  unsigned short iNodeType;
  db2LdapProtocolInfo iProtocol;
  char * piBindDN;
  char * piPassword;
} db2LdapUpdateStruct;

typedef struct
{
  char iType;
  char * piHostName;
  char * piServiceName;
  char * piNetbiosName;
  char * piNetworkId;
  char * piPartnerLU;
  char * piTPName;
  char * piMode;
  unsigned short iSecurityType;
  char * piLanAdapterAddress;
  char * piChangePasswordLU;
  char * piIpxAddress;
} db2LdapProtocolInfo;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParamStruct*.

pParamStruct
Input. A pointer to the *db2LdapUpdateStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piNodeName
Input. Specify the node name that represents the DB2 server in LDAP.

piComment
Input. Specify a new description for the DB2 server. Maximum length is 30 characters. A carriage return or a line feed character is not permitted.

iNodeType
Input. Specify a new node type. Valid values are:

```
SQLF_NT_SERVER
SQLF_NT_MPP
SQLF_NT_DCS
SQL_PARM_UNCHANGE
```

iProtocol
Input. Specify the updated protocol information in the *db2LdapProtocolInfo* structure.

piBindDN
Input. Specify the user's LDAP distinguished name (DN). The LDAP user DN must have sufficient authority to create and update the object in the LDAP directory. If the user's LDAP DN is not specified, the credentials of the current logon user will be used.

piPassword
Input. Account password.

iType Input. Specify the protocol type that this server supports. Valid values are:

```
SQL_PROTOCOL_APPN   - For APPC/APPN support
SQL_PROTOCOL_NETB   - For NetBIOS support
SQL_PROTOCOL_TCPIP  - For TCP/IP support
SQL_PROTOCOL_SOCKS  - For TCP/IP with socket security
SQL_PROTOCOL_IPXSPX - For IPX/SPX support
SQL_PROTOCOL_NPIPE  - For Windows NT Named Pipe support
```

piHostName
Input. Specify a new TCP/IP host name or IP address.

piServiceName
Input. Specify a new TCP/IP service name or port number.

piNetbiosName
Input. Specify a new NetBIOS workstation name.

piNetworkID
Input. Specify a new network ID.

piPartnerLU
Input. Specify a new partner LU name for the DB2 server machine.

piTPName
Input. Specify a new transaction program name.

piMode
Input. Specify a new mode name.

iSecurityType
Input. Specify a new security level. Valid values are:

```
SQL_CPIC_SECURITY_NONE
SQL_CPIC_SECURITY_SAME
SQL_CPIC_SECURITY_PROGRAM
SQL_PARM_UNCHANGE
```

piLanAdapterAddress
Input. Specify a new network adapter address.

piChangePasswordLU
Input. Specify a new name of the partner LU to use when changing the password for the host database server.

piIpxAddress
Input. Specify a new IPX address.

db2LoadQuery - Load Query

Checks the status of a load operation during processing.

Authorization

None

Required Connection

Database

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Load Query */
/* ... */
SQL_API_RC SQL_API_FN
db2LoadQuery (
  db2Uint32 versionNumber,
  void * pParmStruct,
  struct sqlca *pSqlca);

typedef struct
{
  db2Uint32 iStringType;
  char * piString;
  db2Uint32 iShowLoadMessages;
  db2LoadQueryOutputStruct * poOutputStruct;
  char * piLocalMessageFile;
} db2LoadQueryStruct;

typedef struct
{
  db2Uint32 oRowsRead;
  db2Uint32 oRowsSkipped;
  db2Uint32 oRowsCommitted;
  db2Uint32 oRowsLoaded;
  db2Uint32 oRowsRejected;
  db2Uint32 oRowsDeleted;
  db2Uint32 oCurrentIndex;
  db2Uint32 oNumTotalIndexes;
  db2Uint32 oCurrentMPPNode;
  db2Uint32 oLoadRestarted;
  db2Uint32 oWhichPhase;
  db2Uint32 oWarningCount;
} db2LoadQueryOutputStruct;
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Load Query */
/* ... */
SQL_API_RC SQL_API_FN
db2gLoadQuery (
  db2Uint32 versionNumber,
  void * pParmStruct,
  struct sqlca *pSqlca);

typedef struct
{
  db2Uint32 iStringType;
  db2Uint32 iStringLen;
  char * piString;
  db2Uint32 iShowLoadMessages;
  db2LoadQueryOutputStruct * poOutputStruct;
  db2Uint32 iLocalMessageFileLen;
  char * piLocalMessageFile
} db2gLoadQueryStruct;

typedef struct
{
  db2Uint32 oRowsRead;
  db2Uint32 oRowsSkipped;
  db2Uint32 oRowsCommitted;
  db2Uint32 oRowsLoaded;
  db2Uint32 oRowsRejected;
  db2Uint32 oRowsDeleted;
  db2Uint32 oCurrentIndex;
  db2Uint32 oNumTotalIndexes;
  db2Uint32 oCurrentMPPNode;
  db2Uint32 oLoadRestarted;
  db2Uint32 oWhichPhase;
  db2Uint32 oWarningCount;
} db2LoadQueryOutputStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. A pointer to the *db2LoadQueryStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iStringType
Input. Specifies a type for *piString*. Valid values (defined in `db2ApiDf.h`) are:

DB2LOADQUERY_TABLENAME
Represents specifying a table name for use by the **db2LoadQuery** API.

iStringLen
Input. Specifies the length in bytes of *piString*.

piString
Input. Specifies a temporary files path name or a table name, depending on the value of *iStringType*.

iShowLoadMessages
Input. Specifies the level of messages that are to be returned by the load utility. Valid values (defined in `db2ApiDf.h`) are:

DB2LOADQUERY_SHOW_ALL_MSGS
Return all load messages.

DB2LOADQUERY_SHOW_NO_MSGS
Return no load messages.

DB2LOADQUERY_SHOW_NEW_MSGS
Return only messages that have been generated since the last call to this API.

poOutputStruct
Output. A pointer to the *db2LoadQueryOutputStruct* structure, which contains load summary information. Set to NULL if a summary is not required.

iLocalMessageFileLen
Input. Specifies the length in bytes of *piLocalMessageFile*.

piLocalMessageFile
Input. Specifies the name of a local file to be used for output messages.

oRowsRead
Output. Number of records read so far by the load utility.

oRowsSkipped
Output. Number of records skipped before the load operation began.

oRowsCommitted
Output. Number of rows committed to the target table so far.

oRowsLoaded
Output. Number of rows loaded into the target table so far.

oRowsRejected
Output. Number of rows rejected from the target table so far.

oRowsDeleted
Output. Number of rows deleted from the target table so far (during the delete phase).

oCurrentIndex
Output. Index currently being built (during the build phase).

oCurrentMPPNode
Output. Indicates which node is being queried (for MPP mode only).

oLoadRestarted
Output. A flag whose value is `TRUE` if the load operation being queried is a load restart operation.

oWhichPhase
Output. Indicates the current phase of the load operation being queried. Valid values (defined in `db2ApiDf.h`) are:

DB2LOADQUERY_LOAD_PHASE
Load phase.

DB2LOADQUERY_BUILD_PHASE
Build phase.

DB2LOADQUERY_DELETE_PHASE
Delete phase.

oNumTotalIndexes
Output. Total number of indexes to be built (during the build phase).

oWarningCount
Output. Total number of warnings returned so far.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\loadqry.sqc
COBOL	\sqllib\samples\cobol\loadqry.sqb

Usage Notes

This API reads the status of the load operation on the table specified by *piString*, and writes the status to the file specified by *pLocalMsgFileName*.

db2MonitorSwitches - Get/Update Monitor Switches

Selectively turns on or off switches for groups of monitor data to be collected by the database manager. Returns the current state of these switches for the application issuing the call.

Scope

This API only returns information for the node on which it is executed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. If there is no instance attachment, a default instance attachment is created.

To display the settings for a remote instance (or a different local instance), it is necessary to first attach to that instance.

API Include File

db2ApiDf.h

C API Syntax

```
int db2MonitorSwitches (db2Uint32 version,
                        void* pParamStruct,
                        struct sqlca* sqlca);

typedef struct
{
        struct sqlm_recording_group     *piGroupStates;
        void                            *poBuffer;
        db2Uint32                       iBufferSize;
        db2Uint32                       iReturnData;
        db2Uint32                       iVersion;
        db2int32                        iNodeNumber;
        db2Uint32                       *poOutputFormat;
}db2MonitorSwitchesData;
```

API Parameters

version
Input. Specifies the version and release level of the structure passed as the second parameter pParamStruct.

pParamStruct
Input. A pointer to the *db2MonitorSwitchesStruct* structure.

sqlca Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piGroupStates
Input. A pointer to the structure containing a list of switches.

poBuffer
A pointer to a buffer where the switch state data will be written.

iBufferSize
Input. Specifies the size of the output buffer.

iReturnData
Input. A flag specifying whether or not the current switch states should be written to the data buffer pointed to by *poBuffer*.

iVersion
Input. Version ID of the database monitor data to collect. The database monitor only returns data that was available for the requested version. Set this parameter to one of the following symbolic constants:

- SQLM_DBMON_VERSION1
- SQLM_DBMON_VERSION2
- SQLM_DBMON_VERSION5
- SQLM_DBMON_VERSION5_2
- SQLM_DBMON_VERSION6
- SQLM_DBMON_VERSION7

Note: If SQLM_DBMON_VERSION1 is specified as the version, the APIs cannot be run remotely.

iNodeNumber
Input. The node where the request is to be sent. Based on this value, the request will be processed for the current node, all nodes or a user specified node. Valid values are:

- SQLM_CURRENT_NODE
- SQLM_ALL_NODES
- *node value*

Note: For standalone instances SQLM_CURRENT_NODE must be used.

poOutputFormat
The format of the stream returned by the server. It will be one of the following:

SQLM_STREAM_STATIC_FORMAT
Indicates that the switch states are returned in static, pre-Version 7 switch structures.

SQLM_STREAM_DYNAMIC_FORMAT
Indicates that the switches are returned in a self-describing format, similar to the format returned for **db2GetSnapshot**.

Note: For detailed information about the use of the database monitor APIs, and for a summary of all database monitor data elements and monitoring groups, see the *System Monitor Guide and Reference*.

Usage Notes

To obtain the status of the switches at the database manager level, call "db2GetSnapshot - Get Snapshot" on page 27, specifying SQMA_DB2 for *OBJ_TYPE* (get snapshot for database manager).

For detailed information about the use of the database monitor APIs, and for a summary of all database monitor data elements and monitoring groups, see the *System Monitor Guide and Reference*.

See Also

"db2GetSnapshot - Get Snapshot" on page 27

"db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer" on page 30

"db2ResetMonitor - Reset Monitor" on page 78.

db2Prune

Deletes entries from the recovery history file or log files from the active log path.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*

Required Connection

Database. To delete entries from the recovery history file for any database other than the default database, a connection to the database must be established before calling this API.

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: Prune Recovery History File */
/* ... */
SQL_API_RC SQL_API_FN
  db2Prune (
    db2Uint32 version,
    void * pDB2PruneStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piString,
  db2Uint32 iEID,
  db2Uint32 iCallerAction,
  db2Uint32 iOptions
} db2PruneStruct;
/* ... */
```

Generic API Syntax

```
/* File: db2ApiDf.h */
/* API: Prune Recovery History File */
/* ... */
SQL_API_RC SQL_API_FN
  db2GenPrune (
    db2Uint32 version,
    void * pDB2GenPruneStruct,
    struct sqlca * pSqlca);

typedef struct
{
  db2Uint32 iStringLen;
  char * piString,
  db2Uint32 iEID,
  db2Uint32 iCallerAction,
  db2Uint32 iOptions
} db2GenPruneStruct;
/* ... */
```

API Parameters

version
Input. Specifies the version and release level of the structure passed in as the second parameter, *pDB2PruneStruct*.

pDB2PruneStruct
Input. A pointer to the *db2PruneStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iStringLen
Input. Specifies the length in bytes of *piString*.

piString
Input. A pointer to a string specifying a time stamp or a log sequence number (LSN). The time stamp or part of a time stamp (minimum *yyyy*, or year) is used to select records for deletion. All entries equal to or less than the time stamp will be deleted. A valid time stamp must be provided; there is no default behavior for a NULL parameter.

This parameter can also be used to pass an LSN, so that inactive logs can be pruned.

iEID Input. Specifies a unique identifier that can be used to prune a single entry from the history file.

iCallerAction
Input. Specifies the type of action to be taken. Valid values (defined in `db2ApiDf`) are:

DB2PRUNE_ACTION_HISTORY
Remove history file entries.

DB2PRUNE_ACTION_LOG
Remove log files from the active log path.

iOptions
Input. Valid values (defined in `db2ApiDf`) are:

DB2PRUNE_OPTION_FORCE
Force the removal of the last backup.

DB2PRUNE_OPTION_LSNSTRING
Specify that the value of *piString* is an LSN, used when a caller action of `DB2PRUNE_ACTION_LOG` is specified.

REXX API Syntax

```
PRUNE RECOVERY HISTORY BEFORE :timestamp [WITH FORCE OPTION]
```

REXX API Parameters

timestamp
A host variable containing a time stamp. All entries with time stamps equal to or less than the time stamp provided are deleted from the recovery history file.

WITH FORCE OPTION
If specified, the recovery history file will be pruned according to the time stamp specified, even if some entries from the most recent restore set are deleted from the file. If not specified, the most recent restore set will be kept, even if the time stamp is less than or equal to the time stamp specified as input.

Usage Notes

Pruning the history file does not delete the actual backup or load files. The user must manually delete these files to free up the space they consume on storage media.

Attention: If the latest full database backup is deleted from the media (in addition to being pruned from the history file), the user must ensure that all table spaces, including the catalog table space and the user table spaces, are backed up. Failure to do so may result in a database that cannot be recovered, or the loss of some portion of the user data in the database.

See Also

"db2HistoryCloseScan - Close Recovery History File Scan" on page 34

"db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36

"db2HistoryOpenScan - Open Recovery History File Scan" on page 39

"db2HistoryUpdate - Update Recovery History File" on page 44.

db2QuerySatelliteProgress

Checks on the status of a satellite synchronization session.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2QuerySatelliteProgress */
/* ... */
SQL_API_RC SQL_API_FN
  db2QuerySatelliteProgress (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);

typedef struct
{
  db2int32 oStep;
  db2int32 oSubstep;
  db2int32 oNumSubsteps;
  db2int32 oScriptStep;
  db2int32 oNumScriptSteps;
  char * poDescription;
  char * poError;
  char * poProgressLog;
} db2QuerySatelliteProgressStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. A pointer to the *db2QuerySatelliteProgressStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

oStep Output. The current step of the synchronization session (defined in `db2ApiDf.h`).

oSubstep
Output. If the synchronization step (*oStep*) can be broken down into substeps, this will be the current substep.

oNumSubsteps
Output. If there exists a substep (*oSubstep*) for the current step of the synchronization session, this will be the total number of substeps that comprise the synchronization step.

oScriptStep
Output. If the current substep is the execution of a script, this parameter reports on the progress of the script execution, if available.

oNumScriptSteps
Output. If a script step is reported, this parameter contains the total number of steps that comprise the script's execution.

poDescription
Output. A description of the state of the satellite's synchronization session.

poError
Output. If the synchronization session is in error, a description of the error is passed by this parameter.

poProgressLog
Output. The entire log of the satellite's synchronization session is returned by this parameter.

db2ResetMonitor - Reset Monitor

Resets the database system monitor data of a specified database, or of all active databases, for the application issuing the call.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. If there is no instance attachment, a default instance attachment is created.

To reset the monitor switches for a remote instance (or a different local instance), it is necessary to first attach to that instance.

API Include File

db2ApiDf.h

C API Syntax

```
int db2ResetMonitor  (db2Uint32 version,
                      void*          pParamStruct,
                      struct sqlca*  sqlca);

typedef struct
{
        db2Uint32                    iResetAll;
        char                         *piDbAlias;
        db2Uint32                    iVersion;
        db2int32                     iNodeNumber;
}db2ResetMonitorData;
```

API Parameters

version
Input. Specifies the version and release level of the structure passed as the second parameter pParamStruct.

pParamStruct
Input. A pointer to the *db2ResetMonitorData* structure.

sqlca Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

iResetAll
Input. The reset flag.

piDbAlias
Input. A pointer to the database alias.

iVersion
Input. Version ID of the database monitor data to collect. The database monitor only returns data that was available for the requested version. Set this parameter to one of the following symbolic constants:

- SQLM_DBMON_VERSION1
- SQLM_DBMON_VERSION2
- SQLM_DBMON_VERSION5
- SQLM_DBMON_VERSION5_2
- SQLM_DBMON_VERSION6
- SQLM_DBMON_VERSION7

Note: If SQLM_DBMON_VERSION1 is specified as the version, the APIs cannot be run remotely.

iNodeNumber
Input. The node where the request is to be sent. Based on this value, the request will be processed for the current node, all nodes or a user specified node. Valid values are:

- SQLM_CURRENT_NODE
- SQLM_ALL_NODES
- *node value*

Note: For standalone instances SQLM_CURRENT_NODE must be used.

Usage Notes

Each process (attachment) has its own private view of the monitor data. If one user resets, or turns off a monitor switch, other users are not affected. When an application first calls any database monitor function, it inherits the default switch settings from the database manager configuration file (see "sqlfxsys - Get Database Manager Configuration" on page 278). These settings can be overridden with "db2MonitorSwitches - Get/Update Monitor Switches" on page 69.

If all active databases are reset, some database manager information is also reset to maintain the consistency of the data that is returned.

This API cannot be used to selectively reset specific data items or specific monitor groups. However, a specific group can be reset by turning its switch off, and then on, using "db2MonitorSwitches - Get/Update Monitor Switches" on page 69.

For detailed information about the use of the database monitor APIs, and for a summary of all database monitor data elements and monitoring groups, see the *System Monitor Guide and Reference*.

See Also

"db2MonitorSwitches - Get/Update Monitor Switches" on page 69

"db2GetSnapshot - Get Snapshot" on page 27

"db2GetSnapshotSize - Estimate Size Required for db2GetSnapshot() Output Buffer" on page 30.

db2SetSyncSession

Sets the synchronization session for a satellite. A synchronization session is associated with the version of the user application executing on the satellite. Each version of an application is supported by a particular database configuration, and manipulates particular data sets, each of which can be synchronized with a central site.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2SetSyncSession */
/* ... */
SQL_API_RC SQL_API_FN
  db2db2SetSyncSession (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);

typedef struct
{
  char * piSyncSessionID;
} db2SetSyncSessionStruct;
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. A pointer to the *db2SetSyncSessionStruct* structure.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

piSyncSessionID
Input. Specifies an identifier for the synchronization session that a satellite will use. The specified value must match the appropriate application version for the satellite's group, as defined at the satellite control server.

db2SyncSatellite

Synchronizes a satellite.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2SyncSatellite */
/* ... */
SQL_API_RC SQL_API_FN
  db2SyncSatellite (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. Set to NULL.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

db2SyncSatelliteStop

Stops the satellite's currently active synchronization session. The session is stopped in such a way that synchronization for this satellite can be restarted where it left off by invoking "db2SyncSatellite" on page 82.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2SyncSatelliteStop */
SQL_API_RC SQL_API_FN
  db2SyncSatelliteStop (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. Set to NULL.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

db2SyncSatelliteTest

Tests the ability of a satellite to synchronize.

Authorization

None

Required Connection

None

API Include File

db2ApiDf.h

C API Syntax

```
/* File: db2ApiDf.h */
/* API: db2SyncSatelliteTest */
/* ... */
SQL_API_RC SQL_API_FN
  db2SyncSatelliteTest (
    db2Uint32 versionNumber,
    void * pParmStruct,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

versionNumber
Input. Specifies the version and release level of the structure passed in as the second parameter, *pParmStruct*.

pParmStruct
Input. Set to NULL.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqlabndx - Bind

Invokes the bind utility, which prepares SQL statements stored in the bind file generated by the precompiler, and creates a package that is stored in the database.

Scope

This API can be called from any node in `db2nodes.cfg`. It updates the database catalogs on the catalog node. Its effects are visible to all nodes.

Authorization

One of the following:

- *sysadm* or *dbadm* authority
- BINDADD privilege if a package does not exist and one of:
  - IMPLICIT_SCHEMA authority on the database if the schema name of the package does not exist
  - CREATEIN privilege on the schema if the schema name of the package exists
- ALTERIN privilege on the schema if the package exists
- BIND privilege on the package if it exists.

The user also needs all privileges required to compile any static SQL statements in the application. Privileges granted to groups are not used for authorization checking of static statements. If the user has *sysadm* authority, but not explicit privileges to complete the bind, the database manager grants explicit *dbadm* authority automatically.

Required Connection

Database

API Include File

sql.h

C API Syntax

```
/* File: sql.h */
/* API: Bind */
/* ... */
SQL_API_RC SQL_API_FN
  sqlabndx (
    _SQLOLDCHAR * pBindFileName,
    _SQLOLDCHAR * pMsgFileName,
    struct sqlopt * pBindOptions,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sql.h */
/* API: Bind */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgbndx (
    unsigned short MsgFileNameLen,
    unsigned short BindFileNameLen,
    struct sqlca * pSqlca,
    struct sqlopt * pBindOptions,
    _SQLOLDCHAR * pMsgFileName,
    _SQLOLDCHAR * pBindFileName);
/* ... */
```

API Parameters

MsgFileNameLen
Input. A 2-byte unsigned integer representing the length of the message file name in bytes.

BindFileNameLen
Input. A 2-byte unsigned integer representing the length of the bind file name in bytes.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pBindOptions
Input. A structure used to pass bind options to the API. For more information about this structure, see "SQLOPT" on page 515.

pMsgFileName
Input. A string containing the destination for error, warning, and informational messages. Can be the path and the name of an operating system file, or a standard device. If a file already exists, it is overwritten. If it does not exist, a file is created.

pBindFileName
Input. A string containing the name of the bind file, or the name of a file containing a list of bind file names. The bind file names must contain the extension `.bnd`. A path for these files can be specified.

Precede the name of a bind list file with the at sign (@). For example, a fully qualified bind list file name might be:

```
/u/user1/bnd/@all.lst
```

The bind list file should contain one or more bind file names, and must have the extension `.lst`.

Precede all but the first bind file name with a plus symbol (+). The bind file names may be on one or more lines. For example, the bind list file `all.lst` might contain:

```
mybind1.bnd+mybind2.bnd+
mybind3.bnd+
mybind4.bnd
```

Path specifications on bind file names in the list file can be used. If no path is specified, the database manager takes path information from the bind list file.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

COBOL \sqllib\samples\cobol\prepbind.sqb

Usage Notes

Binding can be done as part of the precompile process for an application program source file, or as a separate step at a later time. Use BIND when binding is performed as a separate process.

The name used to create the package is stored in the bind file, and is based on the source file name from which it was generated (existing paths or extensions are discarded). For example, a precompiled source file called `myapp.sqc` generates a default bind file called `myapp.bnd` and a default package name of `MYAPP`. (However, the bind file name and the package name can be overridden at precompile time by using the **SQL_BIND_OPT** and the **SQL_PKG_OPT** options in "sqlaprep - Precompile Program" on page 93.)

BIND executes under the transaction that the user has started. After performing the bind, BIND issues a COMMIT (if bind is successful) or a ROLLBACK (if bind is unsuccessful) operation to terminate the current transaction and start another one.

Binding halts if a fatal error or more than 100 errors occur. If a fatal error occurs during binding, BIND stops binding, attempts to close all files, and discards the package.

Binding application programs has prerequisite requirements and restrictions beyond the scope of this manual. For more detailed information about binding application programs to databases, see the *Application Development Guide*.

The following table lists valid values for the *type* and the *val* fields of the bind options structure (see "SQLOPT" on page 515), as well as their corresponding CLP options. For a description of the bind options (including default values), see the *Command Reference*.

Table 4. BIND Option Types and Values

CLP Option	Option Type	Option Values
ACTION ADD	SQL_ACTION_OPT	SQL_ACTION_ADD
ACTION REPLACE	SQL_ACTION_OPT	SQL_ACTION_REPLACE
BLOCKING ALL	SQL_BLOCK_OPT	SQL_BL_ALL
BLOCKING NO	SQL_BLOCK_OPT	SQL_BL_NO
BLOCKING UNAMBIG	SQL_BLOCK_OPT	SQL_BL_UNAMBIG
CCSIDG	SQL_CCSIDG_OPT	sqlopt.sqloptions.val
CCSIDM	SQL_CCSIDM_OPT	sqlopt.sqloptions.val
CCSIDS	SQL_CCSIDS_OPT	sqlopt.sqloptions.val
CHARSUB BIT	SQL_CHARSUB_OPT	SQL_CHARSUB_BIT
CHARSUB DEFAULT	SQL_CHARSUB_OPT	SQL_CHARSUB_DEFAULT
CHARSUB MIXED	SQL_CHARSUB_OPT	SQL_CHARSUB_MIXED
CHARSUB SBCS	SQL_CHARSUB_OPT	SQL_CHARSUB_SBCS
CLIPKG	SQL_CLIPKG_OPT	Integer between 3 and 30
CNULREQD NO	SQL_CNULREQD_OPT	SQL_CNULREQD_NO
CNULREQD YES	SQL_CNULREQD_OPT	SQL_CNULREQD_YES
COLLECTION	SQL_COLLECTION_OPT	sqlchar structure
DATETIME DEF	SQL_DATETIME_OPT	SQL_DATETIME_DEF
DATETIME EUR	SQL_DATETIME_OPT	SQL_DATETIME_EUR
DATETIME ISO	SQL_DATETIME_OPT	SQL_DATETIME_ISO
DATETIME JIS	SQL_DATETIME_OPT	SQL_DATETIME_JIS
DATETIME LOC	SQL_DATETIME_OPT	SQL_DATETIME_LOC
DATETIME USA	SQL_DATETIME_OPT	SQL_DATETIME_USA
DECDEL COMMA	SQL_DECDEL_OPT	SQL_DECDEL_COMMA
DECDEL PERIOD	SQL_DECDEL_OPT	SQL_DECDEL_PERIOD
DEC 15	SQL_DEC_OPT	SQL_DEC_15
DEC 31	SQL_DEC_OPT	SQL_DEC_31
DEGREE 1	SQL_DEGREE_OPT	SQL_DEGREE_1
DEGREE ANY	SQL_DEGREE_OPT	SQL_DEGREE_ANY
DEGREE degree	SQL_DEGREE_OPT	Integer between 1 and 32767.
DYNAMICRULES BIND	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_BIND
DYNAMICRULES RUN	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_RUN
DYNAMICRULES DEFINE	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_DEFINE
DYNAMICRULES INVOKE	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_INVOKE
EXPLAIN NO	SQL_EXPLAIN_OPT	SQL_EXPLAIN_NO
EXPLAIN YES	SQL_EXPLAIN_OPT	SQL_EXPLAIN_YES
EXPLAIN ALL	SQL_EXPLAIN_OPT	SQL_EXPLAIN_ALL
EXPLSNAP NO	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_NO

Table 4. BIND Option Types and Values (continued)

CLP Option	Option Type	Option Values
EXPLSNAP YES	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_YES
EXPLSNAP ALL	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_ALL
FUNCPATH	SQL_FUNCTION_PATH	sqlchar structure
GENERIC	SQL_GENERIC_OPT	sqlchar structure
GRANT	SQL_GRANT_OPT	sqlchar structure
GRANT PUBLIC	SQL_GRANT_OPT	sqlchar structure
GRANT TO USER	SQL_GRANT_USER_OPT	sqlchar structure
GRANT TO GROUP	SQL_GRANT_GROUP_OPT	sqlchar structure
INSERT BUF	SQL_INSERT_OPT	SQL_INSERT_BUF
INSERT DEF	SQL_INSERT_OPT	SQL_INSERT_DEF
ISOLATION RS	SQL_ISO_OPT	SQL_READ_STAB
ISOLATION NC	SQL_ISO_OPT	SQL_NO_COMMIT
ISOLATION CS	SQL_ISO_OPT	SQL_CURSOR_STAB
ISOLATION RR	SQL_ISO_OPT	SQL_REP_READ
ISOLATION UR	SQL_ISO_OPT	SQL_UNCOM_READ
OWNER	SQL_OWNER_OPT	sqlchar structure
QUALIFIER	SQL_QUALIFIER_OPT	sqlchar structure
QUERYOPT	SQL_QUERYOPT_OPT	SQL_QUERYOPT_0,1,2,3,5,7,9
RELEASE COMMIT	SQL_RELEASE_OPT	SQL_RELEASE_COMMIT
RELEASE DEALLOCATE	SQL_RELEASE_OPT	SQL_RELEASE_DEALLOCATE
REPLVER	SQL_REPLVER_OPT	sqlchar structure
RETAIN NO	SQL_RETAIN_OPT	SQL_RETAIN_NO
RETAIN YES	SQL_RETAIN_OPT	SQL_RETAIN_YES
SQLERROR CHECK	SQL_SQLERROR_OPT	SQL_SQLERROR_CHECK
SQLERROR CONTINUE	SQL_SQLERROR_OPT	SQL_SQLERROR_CONTINUE
SQLERROR NOPACKAGE	SQL_SQLERROR_OPT	SQL_SQLERROR_NOPACKAGE
SQLWARN NO	SQL_SQLWARN_OPT	SQL_SQLWARN_NO
SQLWARN YES	SQL_SQLWARN_OPT	SQL_SQLWARN_YES
STRDEL APOSTROPHE	SQL_STRDEL_OPT	SQL_STRDEL_APOSTROPHE
STRDEL QUOTE	SQL_STRDEL_OPT	SQL_STRDEL_QUOTE
TEXT	SQL_TEXT_OPT	sqlchar structure
TRANSFORM GROUP	SQL_TRANSFORMGROUP_OPT	sqlchar structure
VALIDATE BIND	SQL_VALIDATE_OPT	SQL_VALIDATE_BIND
VALIDATE RUN	SQL_VALIDATE_OPT	SQL_VALIDATE_RUN
Note: Option values showing `sqlchar structure` have a *val* field that contains a pointer to "SQLCHAR" on page 452. This structure contains a character string that specifies the option value.		

See Also

"sqlaprep - Precompile Program" on page 93.

sqlaintp - Get Error Message

Retrieves the message associated with an error condition specified by the *sqlcode* field of the *sqlca* structure.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
/* File: sql.h */
/* API: Get Error Message */
/* ... */
SQL_API_RC SQL_API_FN
  sqlaintp (
    char * pBuffer,
    short BufferSize,
    short LineWidth,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sql.h */
/* API: Get Error Message */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgintp (
    short BufferSize,
    short LineWidth,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pBuffer);
/* ... */
```

API Parameters

BufferSize
Input. Size, in bytes, of a string buffer to hold the retrieved message text.

LineWidth
Input. The maximum line width for each line of message text. Lines are broken on word boundaries. A value of zero indicates that the message text is returned without line breaks.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pBuffer
Output. A pointer to a string buffer where the message text is placed. If the message must be truncated to fit in the buffer, the truncation allows for the null string terminator character.

REXX API Syntax

```
GET MESSAGE INTO :msg [LINEWIDTH width]
```

REXX API Parameters

msg REXX variable into which the text message is placed.

width Maximum line width for each line in the text message. The line is broken on word boundaries. If *width* is not given or set to `0`, the message text returns without line breaks.

Sample Programs

C	\sqllib\samples\c\utilapi.c
COBOL	\sqllib\samples\cobol\checkerr.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

Usage Notes

One message is returned per call.

A new line (line feed, LF, or carriage return/line feed, CR/LF) sequence is placed at the end of each message.

If a positive line width is specified, new line sequences are inserted between words so that the lines do not exceed the line width.

If a word is longer than a line width, the line is filled with as many characters as will fit, a new line is inserted, and the remaining characters are placed on the next line.

Return Codes

Code	Message
+i	Positive integer indicating the number of bytes in the formatted message. If this is greater than the buffer size input by the caller, the message is truncated.
-1	Insufficient memory available for message formatting services to function. The requested message is not returned.
-2	No error. The *sqlca* did not contain an error code (SQLCODE = 0).
-3	Message file inaccessible or incorrect.
-4	Line width is less than zero.
-5	Invalid *sqlca*, bad buffer address, or bad buffer length.

If the return code is -1 or -3, the message buffer will contain additional information about the problem.

See Also

"sqlogstt - Get SQLSTATE Message" on page 284.

sqlaprep - Precompile Program

Processes an application program source file containing embedded SQL statements. A modified source file is produced containing host language calls for the SQL statements and, by default, a package is created in the database.

Scope

This API can be called from any node in `db2nodes.cfg`. It updates the database catalogs on the catalog node. Its effects are visible to all nodes.

Authorization

One of the following:

- *sysadm* or *dbadm* authority
- BINDADD privilege if a package does not exist and one of:
  - IMPLICIT_SCHEMA authority on the database if the schema name of the package does not exist
  - CREATEIN privilege on the schema if the schema name of the package exists
- ALTERIN privilege on the schema if the package exists
- BIND privilege on the package if it exists.

The user also needs all privileges required to compile any static SQL statements in the application. Privileges granted to groups are not used for authorization checking of static statements. If the user has *sysadm* authority, but not explicit privileges to complete the bind, the database manager grants explicit *dbadm* authority automatically.

Required Connection

Database

API Include File

sql.h

C API Syntax

```
/* File: sql.h */
/* API: Precompile Program */
/* ... */
SQL_API_RC SQL_API_FN
  sqlaprep (
    _SQLOLDCHAR * pProgramName,
    _SQLOLDCHAR * pMsgFileName,
    struct sqlopt * pPrepOptions,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sql.h */
/* API: Precompile Program */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgprep (
    unsigned short MsgFileNameLen,
    unsigned short ProgramNameLen,
    struct sqlca * pSqlca,
    struct sqlopt * pPrepOptions,
    _SQLOLDCHAR * pMsgFileName,
    _SQLOLDCHAR * pProgramName);
/* ... */
```

API Parameters

MsgFileNameLen
Input. A 2-byte unsigned integer representing the length of the message file name in bytes.

ProgramNameLen
Input. A 2-byte unsigned integer representing the length of the program name in bytes.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pPrepOptions
Input. A structure used to pass precompile options to the API. For more information about this structure, see "SQLOPT" on page 515.

pMsgFileName
Input. A string containing the destination for error, warning, and informational messages. Can be the path and the name of an operating system file, or a standard device. If a file already exists, it is overwritten. If it does not exist, a file is created.

pProgramName
Input. A string containing the name of the application to be precompiled. Use the following extensions:

- `.sqb` - for COBOL applications
- `.sqc` - for C applications
- `.sqC` - for UNIX C++ applications
- `.sqf` - for FORTRAN applications
- `.sqx` - for C++ applications

When the TARGET option is used, the input file name extension does not have to be from this predefined list.

The preferred extension for C++ applications containing embedded SQL on UNIX based systems is `sqC`; however, the `sqx` convention, which was invented for systems that are not case sensitive, is tolerated by UNIX based systems.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C \sqllib\samples\c\makeapi.sqc

COBOL \sqllib\samples\cobol\prepbind.sqb

Usage Notes

A modified source file is produced, which contains host language equivalents to the SQL statements. By default, a package is created in the database to which a connection has been established. The name of the package is the same as the program file name (minus the extension and folded to uppercase), up to a maximum of 8 characters.

Following connection to a database, **sqlaprep** executes under the transaction that was started. PRECOMPILE PROGRAM then issues a COMMIT or a ROLLBACK operation to terminate the current transaction and start another one.

Precompiling stops if a fatal error or more than 100 errors occur. If a fatal error does occur, PRECOMPILE PROGRAM stops precompiling, attempts to close all files, and discards the package.

The following table lists valid values for the *type* and the *val* fields of the precompile options structure (see "SQLOPT" on page 515), as well as their corresponding CLP options. For a description of the precompile options (including default values), see the *Command Reference*.

Table 5. PRECOMPILE Option Types and Values

CLP Option	API Option Type	API Option Values
ACTION ADD	SQL_ACTION_OPT	SQL_ACTION_ADD
ACTION REPLACE	SQL_ACTION_OPT	SQL_ACTION_REPLACE
BINDFILE	SQL_BIND_OPT	Null
BINDFILE filename	SQL_BIND_OPT	sqlchar structure
BLOCKING ALL	SQL_BLOCK_OPT	SQL_BL_ALL

Table 5. PRECOMPILE Option Types and Values (continued)

CLP Option	API Option Type	API Option Values
BLOCKING NO	SQL_BLOCK_OPT	SQL_BL_NO
BLOCKING UNAMBIG	SQL_BLOCK_OPT	SQL_BL_UNAMBIG
CCSIDG value	SQL_CCSIDG_OPT	sqlopt.sqloptions.val
CCSIDM value	SQL_CCSIDM_OPT	sqlopt.sqloptions.val
CCSIDS value	SQL_CCSIDS_OPT	sqlopt.sqloptions.val
CHARSUB BIT	SQL_CHARSUB_OPT	SQL_CHARSUB_BIT
CHARSUB DEFAULT	SQL_CHARSUB_OPT	SQL_CHARSUB_DEFAULT
CHARSUB MIXED	SQL_CHARSUB_OPT	SQL_CHARSUB_MIXED
CHARSUB SBCS	SQL_CHARSUB_OPT	SQL_CHARSUB_SBCS
CNULREQD NO	SQL_CNULREQD_OPT	SQL_CNULREQD_NO
CNULREQD YES	SQL_CNULREQD_OPT	SQL_CNULREQD_YES
COLLECTION coll-id	SQL_COLLECTION_OPT	sqlchar structure
CONNECT 1	SQL_CONNECT_OPT	SQL_CONNECT_1
CONNECT 2	SQL_CONNECT_OPT	SQL_CONNECT_2
DATETIME DEF	SQL_DATETIME_OPT	SQL_DATETIME_DEF
DATETIME EUR	SQL_DATETIME_OPT	SQL_DATETIME_EUR
DATETIME ISO	SQL_DATETIME_OPT	SQL_DATETIME_ISO
DATETIME JIS	SQL_DATETIME_OPT	SQL_DATETIME_JIS
DATETIME LOC	SQL_DATETIME_OPT	SQL_DATETIME_LOC
DATETIME USA	SQL_DATETIME_OPT	SQL_DATETIME_USA
DECDEL COMMA	SQL_DECDEL_OPT	SQL_DECDEL_COMMA
DECDEL PERIOD	SQL_DECDEL_OPT	SQL_DECDEL_PERIOD
DEC 15	SQL_DEC_OPT	SQL_DEC_15
DEC 31	SQL_DEC_OPT	SQL_DEC_31
DEFERRED_PREPARE ALL	SQL_DEFERRED_PREPARE_OPT	SQL_DEFERRED_PREPARE_ALL
DEFERRED_PREPARE NO	SQL_DEFERRED_PREPARE_OPT	SQL_DEFERRED_PREPARE_NO
DEFERRED_PREPARE YES	SQL_DEFERRED_PREPARE_OPT	SQL_DEFERRED_PREPARE_YES
DEGREE 1	SQL_DEGREE_OPT	SQL_DEGREE_1
DEGREE ANY	SQL_DEGREE_OPT	SQL_DEGREE_ANY
DEGREE degree	SQL_DEGREE_OPT	Integer between 1 and 32767.
DISCONNECT EXPLICIT	SQL_DISCONNECT_OPT	SQL_DISCONNECT_EXPL
DISCONNECT CONDITIONAL	SQL_DISCONNECT_OPT	SQL_DISCONNECT_COND
DISCONNECT AUTOMATIC	SQL_DISCONNECT_OPT	SQL_DISCONNECT_AUTO
DYNAMICRULES BIND	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_BIND
DYNAMICRULES RUN	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_RUN
DYNAMICRULES DEFINE	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_DEFINE
DYNAMICRULES INVOKE	SQL_DYNAMICRULES_OPT	SQL_DYNAMICRULES_INVOKE
EXPLAIN NO	SQL_EXPLAIN_OPT	SQL_EXPLAIN_NO
EXPLAIN YES	SQL_EXPLAIN_OPT	SQL_EXPLAIN_YES

Table 5. PRECOMPILE Option Types and Values (continued)

CLP Option	API Option Type	API Option Values
EXPLAIN ALL	SQL_EXPLAIN_OPT	SQL_EXPLAIN_ALL Not supported by DRDA.
EXPLSNAP NO	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_NO
EXPLSNAP YES	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_YES
EXPLSNAP ALL	SQL_EXPLSNAP_OPT	SQL_EXPLSNAP_ALL
FUNCPATH	SQL_FUNCTION_PATH	sqlchar structure
GENERIC	SQL_GENERIC_OPT	sqlchar structure
INSERT BUF	SQL_INSERT_OPT	SQL_INSERT_BUF
INSERT DEF	SQL_INSERT_OPT	SQL_INSERT_DEF
ISOLATION RS	SQL_ISO_OPT	SQL_READ_STAB
ISOLATION NC	SQL_ISO_OPT	SQL_NO_COMMIT
ISOLATION CS	SQL_ISO_OPT	SQL_CURSOR_STAB
ISOLATION RR	SQL_ISO_OPT	SQL_REP_READ
ISOLATION UR	SQL_ISO_OPT	SQL_UNCOM_READ
LANGLEVEL SAA1	SQL_STANDARDS_OPT	SQL_SAA_COMP
LANGLEVEL MIA	SQL_STANDARDS_OPT	SQL_MIA_COMP
LANGLEVEL SQL92E	SQL_STANDARDS_OPT	SQL_SQL92E_COMP
LEVEL levelname	SQL_LEVEL_OPT	sqlchar structure
LONGERROR NO	SQL_LONGERROR_OPT	SQL_LONGERROR_NO
LONGERROR YES	SQL_LONGERROR_OPT	SQL_LONGERROR_YES
NOLINEMACRO	SQL_LINEMACRO_OPT	SQL_NO_LINE_MACROS
(default)	SQL_LINEMACRO_OPT	SQL_LINE_MACROS
OPTLEVEL 0	SQL_OPTIM_OPT	SQL_DONT_OPTIMIZE
OPTLEVEL 1	SQL_OPTIM_OPT	SQL_OPTIMIZE
OUTPUT filename	SQL_PREP_OUTPUT_OPT	sqlchar structure
OWNER	SQL_OWNER_OPT	sqlchar structure
PACKAGE	SQL_PKG_OPT	Null
PACKAGE pkgname	SQL_PKG_OPT	sqlchar structure
PREPROCESSOR ″preprocessor-command″	SQL_PREPROCESSOR_OPT	sqlchar structure
QUALIFIER	SQL_QUALIFIER_OPT	sqlchar structure
QUERYOPT	SQL_QUERYOPT_OPT	SQL_QUERYOPT_0,1,2,3,5,7,9
RELEASE COMMIT	SQL_RELEASE_OPT	SQL_RELEASE_COMMIT
RELEASE DEALLOCATE	SQL_RELEASE_OPT	SQL_RELEASE_DEALLOCATE
REPLVER versn-str	SQL_REPLVER_OPT	sqlchar structure
RETAIN NO	SQL_RETAIN_OPT	SQL_RETAIN_NO
RETAIN YES	SQL_RETAIN_OPT	SQL_RETAIN_YES
SQLCA SAA	SQL_SAA_OPT	SQL_SAA_YES
SQLCA NONE	SQL_SAA_OPT	SQL_SAA_NO
SQLERROR CHECK	SQL_SQLERROR_OPT	SQL_SQLERROR_CHECK
SQLERROR CONTINUE	SQL_SQLERROR_OPT	SQL_SQLERROR_CONTINUE

Table 5. PRECOMPILE Option Types and Values (continued)

CLP Option	API Option Type	API Option Values
SQLERROR NOPACKAGE	SQL_SQLERROR_OPT	SQL_SQLERROR_NOPACKAGE
SQLFLAG SQL92E SYNTAX	SQL_FLAG_OPT	SQL_SQL92E_SYNTAX
SQLFLAG MVSDB2V23 SYNTAX	SQL_FLAG_OPT	SQL_MVSDB2V23_SYNTAX
SQLFLAG MVSDB2V31 SYNTAX	SQL_FLAG_OPT	SQL_MVSDB2V31_SYNTAX
SQLFLAG MVSDB2V41 SYNTAX	SQL_FLAG_OPT	SQL_MVSDB2V41_SYNTAX
SQLRULES DB2	SQL_RULES_OPT	SQL_RULES_DB2
SQLRULES STD	SQL_RULES_OPT	SQL_RULES_STD
SQLWARN NO	SQL_SQLWARN_OPT	SQL_SQLWARN_NO
SQLWARN YES	SQL_SQLWARN_OPT	SQL_SQLWARN_YES
STRDEL APOSTROPHE	SQL_STRDEL_OPT	SQL_STRDEL_APOSTROPHE
STRDEL QUOTE	SQL_STRDEL_OPT	SQL_STRDEL_QUOTE
SYNCPOINT ONEPHASE	SQL_SYNCPOINT_OPT	SQL_SYNC_ONEPHASE
SYNCPOINT TWOPHASE	SQL_SYNCPOINT_OPT	SQL_SYNC_TWOPHASE
SYNCPOINT NONE	SQL_SYNCPOINT_OPT	SQL_SYNC_NONE
SYNTAX	SQL_SYNTAX_OPT	SQL_SYNTAX_CHECK
(default)	SQL_SYNTAX_OPT	SQL_NO_SYNTAX_CHECK
TARGET compiler	SQL_TARGET_OPT	sqlchar structure
TEXT text-str	SQL_TEXT_OPT	sqlchar structure
TRANSFORM GROUP	SQL_TRANSFORMGROUP_OPT	sqlchar structure
VALIDATE BIND	SQL_VALIDATE_OPT	SQL_VALIDATE_BIND
VALIDATE RUN	SQL_VALIDATE_OPT	SQL_VALIDATE_RUN
VERSION versn-str	SQL_VERSION_OPT	sqlchar structure
WCHARTYPE CONVERT	SQL_WCHAR_OPT	SQL_WCHAR_CONVERT
WCHARTYPE NOCONVERT	SQL_WCHAR_OPT	SQL_WCHAR_NOCONVERT
(none)	SQL_NO_OPT	(none)

See Also

"sqlabndx - Bind" on page 85.

sqlarbnd - Rebind

Allows the user to recreate a package stored in the database without the need for a bind file.

Authorization

One of the following:

- *sysadm* or *dbadm* authority
- ALTERIN privilege on the schema
- BIND privilege on the package.

The authorization ID logged in the BOUNDBY column of the SYSCAT.PACKAGES system catalog table, which is the ID of the most recent binder of the package, is used as the binder authorization ID for the rebind, and for the default *schema* for table references in the package. Note that this default qualifier may be different from the authorization ID of the user executing the rebind request. REBIND will use the same bind options that were specified when the package was created.

Required Connection

Database

API Include File

sql.h

C API Syntax

```
/* File: sql.h */
/* API: Rebind */
/* ... */
SQL_API_RC SQL_API_FN
  sqlarbnd (
    char * pPackageName,
    struct sqlca * pSqlca,
    struct sqlopt * pRebindOptions);
/* ... */
```

Generic API Syntax

```
/* File: sql.h */
/* API: Rebind */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgrbnd (
    unsigned short PackageNameLen,
    char * pPackageName,
    struct sqlca * pSqlca,
    struct sqlopt * pRebindOptions);
/* ... */
```

API Parameters

PackageNameLen
Input. A 2-byte unsigned integer representing the length of the package name in bytes.

pPackageName
Input. A string containing the qualified or unqualified name that designates the package to be rebound. An unqualified package name is implicitly qualified by the current authorization ID.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pRebindOptions
Input. A pointer to the sqlopt structure, used to pass rebind options to the API. For more information about this structure, see SQLOPT.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\rebind.sqc
COBOL	\sqllib\samples\cobol\rebind.sqb

Usage Notes

REBIND does not automatically commit the transaction following a successful rebind. The user must explicitly commit the transaction. This enables ″what if″ analysis, in which the user updates certain statistics, and then tries to rebind the package to see what changes. It also permits multiple rebinds within a unit of work.

This API:

- Provides a quick way to recreate a package. This enables the user to take advantage of a change in the system without a need for the original bind file. For example, if it is likely that a particular SQL statement can take advantage of a newly created index, REBIND can be used to recreate the package. REBIND can also be used to recreate packages after "sqlustat - Runstats" on page 407 has been executed, thereby taking advantage of the new statistics.
- Provides a method to recreate inoperative packages. Inoperative packages must be explicitly rebound by invoking either the bind utility or the rebind utility. A package will be marked inoperative (the VALID column of the

SYSCAT.PACKAGES system catalog will be set to X) if a function instance on which the package depends is dropped.

- Gives users control over the rebinding of invalid packages. Invalid packages will be automatically (or implicitly) rebound by the database manager when they are executed. This may result in a noticeable delay in the execution of the first SQL request for the invalid package. It may be desirable to explicitly rebind invalid packages, rather than allow the system to automatically rebind them, in order to eliminate the initial delay and to prevent unexpected SQL error messages which may be returned in case the implicit rebind fails. For example, following migration, all packages stored in the database will be invalidated by the DB2 Version 5 migration process. Given that this may involve a large number of packages, it may be desirable to explicitly rebind all of the invalid packages at one time. This explicit rebinding can be accomplished using BIND, REBIND, or the **db2rbind** tool (see "db2rbind - Rebind all Packages" in the *Command Reference*).

The choice of whether to use BIND or REBIND to explicitly rebind a package depends on the circumstances. It is recommended that REBIND be used whenever the situation does not specifically require the use of BIND, since the performance of REBIND is significantly better than that of BIND. BIND *must* be used, however:

- When there have been modifications to the program (for example, when SQL statements have been added or deleted, or when the package does not match the executable for the program).
- When the user wishes to modify any of the bind options as part of the rebind. REBIND does not support any bind options. For example, if the user wishes to have privileges on the package granted as part of the bind process, BIND must be used, since it has an **SQL_GRANT_OPT** option.
- When the package does not currently exist in the database.
- When detection of *all* bind errors is desired. REBIND only returns the first error it detects, and then ends, whereas the BIND command returns the first 100 errors that occur during binding.

REBIND is supported by DB2 Connect.

If REBIND is executed on a package that is in use by another user, the rebind will not occur until the other user's logical unit of work ends, because an exclusive lock is held on the package's record in the SYSCAT.PACKAGES system catalog table during the rebind.

When REBIND is executed, the database manager recreates the package from the SQL statements stored in the SYSCAT.STATEMENTS system catalog table.

If REBIND encounters an error, processing stops, and an error message is returned.

The Explain tables are populated during REBIND if either SQL_EXPLSNAP_OPT or SQL_EXPLAIN_OPT have been set to YES or ALL (check EXPLAIN_SNAPSHOT and EXPLAIN_MODE columns in the catalog). The Explain tables used are those of the REBIND requester, not the original binder.

The following table lists valid values for the *type* and the *val* fields of the rebind options structure (see "SQLOPT" on page 515), as well as their corresponding CLP options. For a description of the rebind options (including default values), see the *Command Reference*.

Table 6. REBIND Option Types and Values

CLP Option	Option Type	Option Value
RESOLVE ANY	SQL_RESOLVE_OPT	SQL_RESOLVE_ANY
RESOLVE CONSERVATIVE	SQL_RESOLVE_OPT	SQL_RESOLVE_CONSERVATIVE

See Also

"sqlabndx - Bind" on page 85

"sqlustat - Runstats" on page 407.

sqlbctcq - Close Tablespace Container Query

Ends a table space container query request and frees the associated resources.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Close Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbctcq (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Close Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgctcq (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C	\sqllib\samples\c\tabscont.sqc
COBOL	\sqllib\samples\cobol\tabscont.sqb

See Also

"sqlbftcq - Fetch Tablespace Container Query" on page 107

"sqlbotcq - Open Tablespace Container Query" on page 116

"sqlbstsc - Set Tablespace Containers" on page 124

"sqlbtcq - Tablespace Container Query" on page 127.

sqlbctsq - Close Tablespace Query

Ends a table space query request, and frees up associated resources.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Close Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbctsq (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Close Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgctsq (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

sqlbctsq - Close Tablespace Query

See Also

"sqlbftpq - Fetch Tablespace Query" on page 109

"sqlbgtss - Get Tablespace Statistics" on page 111

"sqlbotsq - Open Tablespace Query" on page 119

"sqlbstpq - Single Tablespace Query" on page 122

"sqlbmtsq - Tablespace Query" on page 113.

sqlbftcq - Fetch Tablespace Container Query

Fetches a specified number of rows of table space container query data, each row consisting of data for a container.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Fetch Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbftcq (
    struct sqlca * pSqlca,
    sqluint32 MaxContainers,
    struct SQLB_TBSCONTQRY_DATA * pContainerData,
    sqluint32 * pNumContainers);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Fetch Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgftcq (
    struct sqlca * pSqlca,
    sqluint32 MaxContainers,
    struct SQLB_TBSCONTQRY_DATA * pContainerData,
    sqluint32 * pNumContainers);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

MaxContainers
Input. The maximum number of rows of data that the user allocated output area (pointed to by *pContainerData*) can hold.

pContainerData
Output. Pointer to the output area, a structure for query data. For more information about this structure, see "SQLB-TBSCONTQRY-DATA" on page 443. The caller of this API must allocate space for *MaxContainers* of these structures, and set *pContainerData* to point to this space. The API will use this space to return the table space container data.

pNumContainers
Output. Number of rows of output returned.

Sample Programs

C	\sqllib\samples\c\tabscont.sqc
COBOL	\sqllib\samples\cobol\tabscont.sqb

Usage Notes

The user is responsible for allocating and freeing the memory pointed to by the *pContainerData* parameter. This API can only be used after a successful **sqlbotcq** call. It can be invoked repeatedly to fetch the list generated by **sqlbotcq**.

For more information, see "sqlbotcq - Open Tablespace Container Query" on page 116.

See Also

"sqlbctcq - Close Tablespace Container Query" on page 103

"sqlbotcq - Open Tablespace Container Query" on page 116

"sqlbstsc - Set Tablespace Containers" on page 124

"sqlbtcq - Tablespace Container Query" on page 127.

sqlbftpq - Fetch Tablespace Query

Fetches a specified number of rows of table space query data, each row consisting of data for a table space.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Fetch Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbftpq (
    struct sqlca * pSqlca,
    sqluint32 MaxTablespaces,
    struct SQLB_TBSPQRY_DATA * pTablespaceData,
    sqluint32 * pNumTablespaces);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Fetch Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgftpq (
    struct sqlca * pSqlca,
    sqluint32 MaxTablespaces,
    struct SQLB_TBSPQRY_DATA * pTablespaceData,
    sqluint32 * pNumTablespaces);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

MaxTablespaces
Input. The maximum number of rows of data that the user allocated output area (pointed to by *pTablespaceData*) can hold.

pTablespaceData
Input and output. Pointer to the output area, a structure for query data. For more information about this structure, see "SQLB-TBSPQRY-DATA" on page 445. The caller of this API must:

- Allocate space for *MaxTablespaces* of these structures
- Initialize the structures
- Set TBSPQVER in the first structure to `SQLB_TBSPQRY_DATA_ID`
- Set *pTablespaceData* to point to this space. The API will use this space to return the table space data.

pNumTablespaces
Output. Number of rows of output returned.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

Usage Notes

The user is responsible for allocating and freeing the memory pointed to by the *pTablespaceData* parameter. This API can only be used after a successful **sqlbotsq** call. It can be invoked repeatedly to fetch the list generated by **sqlbotsq**.

For more information, see "sqlbotsq - Open Tablespace Query" on page 119.

See Also

"sqlbctsq - Close Tablespace Query" on page 105

"sqlbgtss - Get Tablespace Statistics" on page 111

"sqlbotsq - Open Tablespace Query" on page 119

"sqlbstpq - Single Tablespace Query" on page 122

"sqlbmtsq - Tablespace Query" on page 113.

sqlbgtss - Get Tablespace Statistics

Provides information on the space utilization of a table space.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Tablespace Statistics */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbgtss (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    struct SQLB_TBS_STATS * pTablespaceStats);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Tablespace Statistics */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggtss (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    struct SQLB_TBS_STATS * pTablespaceStats);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

TablespaceId
Input. ID of the single table space to be queried.

pTablespaceStats
Output. A pointer to a user-allocated *SQLB_TBS_STATS* structure. The information about the table space is returned in this structure. For more information about this structure, see "SQLB-TBS-STATS" on page 441.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

Usage Notes

See "SQLB-TBS-STATS" on page 441 for information about the fields returned and their meaning.

See Also

"sqlbctsq - Close Tablespace Query" on page 105

"sqlbftpq - Fetch Tablespace Query" on page 109

"sqlbotsq - Open Tablespace Query" on page 119

"sqlbstpq - Single Tablespace Query" on page 122

"sqlbmtsq - Tablespace Query" on page 113.

sqlbmtsq - Tablespace Query

Provides a one-call interface to the table space query data. The query data for all table spaces in the database is returned in an array.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbmtsq (
    struct sqlca * pSqlca,
    sqluint32 * pNumTablespaces,
    struct SQLB_TBSPQRY_DATA *** pppTablespaceData,
    sqluint32 reserved1,
    sqluint32 reserved2);
/* ... */
```

sqlbmtsq - Tablespace Query

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgmtsq (
    struct sqlca * pSqlca,
    sqluint32 * pNumTablespaces,
    struct SQLB_TBSPQRY_DATA *** pppTablespaceData,
    sqluint32 reserved1,
    sqluint32 reserved2);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNumTablespaces
Output. The total number of table spaces in the connected database.

pppTablespaceData
Output. The caller supplies the API with the address of a pointer. The space for the table space query data is allocated by the API, and a pointer to that space is returned to the caller. On return from the call, the pointer points to an array of *SQLB_TBSPQRY_DATA* pointers to the complete set of table space query data.

reserved1
Input. Always `SQLB_RESERVED1`.

reserved2
Input. Always `SQLB_RESERVED2`.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

Usage Notes

This API uses the lower level services, namely:

- "sqlbotsq - Open Tablespace Query" on page 119
- "sqlbftpq - Fetch Tablespace Query" on page 109
- "sqlbctsq - Close Tablespace Query" on page 105

to get all of the table space query data at once.

If sufficient memory is available, this function returns the number of table spaces, and a pointer to the memory location of the table space query data. It is the user's responsibility to free this memory with a call to **sqlefmem** (see "sqlefmem - Free Memory" on page 195).

If sufficient memory is not available, this function simply returns the number of table spaces, and no memory is allocated. If this should happen, use "sqlbotsq - Open Tablespace Query" on page 119, "sqlbftpq - Fetch Tablespace Query" on page 109, and "sqlbctsq - Close Tablespace Query" on page 105, to fetch less than the whole list at once.

See Also

"sqlbctsq - Close Tablespace Query" on page 105

"sqlbftpq - Fetch Tablespace Query" on page 109

"sqlbgtss - Get Tablespace Statistics" on page 111

"sqlbotsq - Open Tablespace Query" on page 119

"sqlbstpq - Single Tablespace Query" on page 122.

sqlbotcq - Open Tablespace Container Query

Prepares for a table space container query operation, and returns the number of containers currently in the table space.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Open Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbotcq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    sqluint32 * pNumContainers);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Open Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgotcq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    sqluint32 * pNumContainers);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

TablespaceId
Input. ID of the table space for which container data is desired. If the

special identifier SQLB_ALL_TABLESPACES (in sqlutil) is specified, a complete list of containers for the entire database is produced.

pNumContainers
Output. The number of containers in the specified table space.

Sample Programs

C	\sqllib\samples\c\tabscont.sqc
COBOL	\sqllib\samples\cobol\tabscont.sqb

Usage Notes

This API is normally followed by one or more calls to "sqlbftcq - Fetch Tablespace Container Query" on page 107, and then by one call to "sqlbctcq - Close Tablespace Container Query" on page 103.

An application can use the following APIs to fetch information about containers in use by table spaces:

- "sqlbtcq - Tablespace Container Query" on page 127

  Fetches a complete list of container information. The API allocates the space required to hold the information for all the containers, and returns a pointer to this information. Use this API to scan the list of containers for specific information. Using this API is identical to calling the three APIs below (**sqlbotcq**, **sqlbftcq**, and **sqlbctcq**), except that this API automatically allocates the memory for the output information. A call to this API must be followed by a call to "sqlefmem - Free Memory" on page 195 to free the memory.
- "sqlbotcq - Open Tablespace Container Query" on page 116
- "sqlbftcq - Fetch Tablespace Container Query" on page 107
- "sqlbctcq - Close Tablespace Container Query" on page 103

  These three APIs function like an SQL cursor, in that they use the OPEN/FETCH/CLOSE paradigm. The caller must provide the output area for the fetch. Unlike an SQL cursor, only one table space container query can be active at a time. Use this set of APIs to scan the list of table space containers for specific information. These APIs allows the user to control the memory requirements of an application (compared with "sqlbtcq - Tablespace Container Query" on page 127).

When **sqlbotcq** is called, a snapshot of the current container information is formed in the agent servicing the application. If the application issues a second table space container query call (**sqlbtcq** or **sqlbotcq**), this snapshot is replaced with refreshed information.

No locking is performed, so the information in the buffer may not reflect changes made by another application after the snapshot was generated. The information is not part of a transaction.

There is one snapshot buffer for table space queries and another for table space container queries. These buffers are independent of one another.

See Also

"sqlbctcq - Close Tablespace Container Query" on page 103

"sqlbftcq - Fetch Tablespace Container Query" on page 107

"sqlbstsc - Set Tablespace Containers" on page 124

"sqlbtcq - Tablespace Container Query" on page 127.

sqlbotsq - Open Tablespace Query

Prepares for a table space query operation, and returns the number of table spaces currently in the database.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Open Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbotsq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceQueryOptions,
    sqluint32 * pNumTablespaces);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Open Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgotsq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceQueryOptions,
    sqluint32 * pNumTablespaces);
/* ... */
```

API Parameters

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

TablespaceQueryOptions
Input. Indicates which table spaces to process. Valid values (defined in `sqlutil`) are:

SQLB_OPEN_TBS_ALL
Process all the table spaces in the database.

SQLB_OPEN_TBS_RESTORE
Process only the table spaces that the user's agent is restoring.

pNumTablespaces
Output. The number of table spaces in the connected database.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

Usage Notes

This API is normally followed by one or more calls to "sqlbftpq - Fetch Tablespace Query" on page 109, and then by one call to "sqlbctsq - Close Tablespace Query" on page 105.

An application can use the following APIs to fetch information about the currently defined table spaces:

- "sqlbstpq - Single Tablespace Query" on page 122

  Fetches information about a given table space. Only one table space entry is returned (into a space provided by the caller). Use this API when the table space identifier is known, and information about only that table space is desired.
- "sqlbmtsq - Tablespace Query" on page 113

  Fetches information about all table spaces. The API allocates the space required to hold the information for all table spaces, and returns a pointer to this information. Use this API to scan the list of table spaces when searching for specific information. Using this API is identical to calling the three APIs below, except that this API automatically allocates the memory for the output information. A call to this API must be followed by a call to "sqlefmem - Free Memory" on page 195 to free the memory.
- "sqlbotsq - Open Tablespace Query" on page 119
- "sqlbftpq - Fetch Tablespace Query" on page 109
- "sqlbctsq - Close Tablespace Query" on page 105

  These three APIs function like an SQL cursor, in that they use the OPEN/FETCH/CLOSE paradigm. The caller must provide the output area for the fetch. Unlike an SQL cursor, only one table space query may be active at a time. Use this set of APIs to scan the list of table spaces when searching for specific information. This set of APIs allows the user to

control the memory requirements of an application (compared with "sqlbmtsq - Tablespace Query" on page 113).

When **sqlbotsq** is called, a snapshot of the current table space information is buffered in the agent servicing the application. If the application issues a second table space query call (**sqlbtsq** or **sqlbotsq**), this snapshot is replaced with refreshed information.

No locking is performed, so the information in the buffer may not reflect more recent changes made by another application. The information is not part of a transaction.

There is one snapshot buffer for table space queries and another for table space container queries. These buffers are independent of one another.

See Also

"sqlbctsq - Close Tablespace Query" on page 105

"sqlbftpq - Fetch Tablespace Query" on page 109

"sqlbstpq - Single Tablespace Query" on page 122

"sqlbmtsq - Tablespace Query" on page 113.

sqlbstpq - Single Tablespace Query

Retrieves information about a single currently defined table space.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Single Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbstpq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    struct SQLB_TBSPQRY_DATA * pTablespaceData,
    sqluint32 reserved);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Single Tablespace Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgstpq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    struct SQLB_TBSPQRY_DATA * pTablespaceData,
    sqluint32reserved);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

TablespaceId
Input. Identifier for the table space which is to be queried.

pTablespaceData
Input and output. Pointer to a user-supplied *SQLB_TBSPQRY_DATA* structure where the table space information will be placed upon return. The caller of this API must initialize the structure and set TBSPQVER to `SQLB_TBSPQRY_DATA_ID` (in `sqlutil`).

reserved
Input. Always `SQLB_RESERVED1`.

Sample Programs

C	\sqllib\samples\c\tabspace.sqc
COBOL	\sqllib\samples\cobol\tabspace.sqb

Usage Notes

This API retrieves information about a single table space if the table space identifier to be queried is known. This API provides an alternative to the more expensive OPEN TABLESPACE QUERY, FETCH, and CLOSE combination of APIs, which must be used to scan for the desired table space when the table space identifier is not known in advance. The table space IDs can be found in the system catalogs. No agent snapshot is taken; since there is only one entry to return, it is returned directly.

For more information, see "sqlbotsq - Open Tablespace Query" on page 119.

See Also

"sqlbctsq - Close Tablespace Query" on page 105

"sqlbftpq - Fetch Tablespace Query" on page 109

"sqlbgtss - Get Tablespace Statistics" on page 111

"sqlbotsq - Open Tablespace Query" on page 119

"sqlbmtsq - Tablespace Query" on page 113.

sqlbstsc - Set Tablespace Containers

This API facilitates the provision of a *redirected* restore, in which the user is restoring a database, and a different set of operating system storage containers is desired or required.

Use this API when the table space is in a *storage definition pending* or a *storage definition allowed* state. These states are possible during a restore operation, immediately prior to the restoration of database pages.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Set Tablespace Containers */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbstsc (
    struct sqlca * pSqlca,
    sqluint32 SetContainerOptions,
    sqluint32 TablespaceId,
    sqluint32 NumContainers,
    struct SQLB_TBSCONTQRY_DATA * pContainerData);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Set Tablespace Containers */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgstsc (
    struct sqlca * pSqlca,
    sqluint32 SetContainerOptions,
    sqluint32 TablespaceId,
    sqluint32 NumContainers,
    struct SQLB_TBSCONTQRY_DATA * pContainerData);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

SetContainerOptions
Input. Use this field to specify additional options. Valid values (defined in `sqlutil`) are:

SQLB_SET_CONT_INIT_STATE
Redo alter table space operations when performing a roll forward.

SQLB_SET_CONT_FINAL_STATE
Ignore alter table space operations in the log when performing a roll forward.

TablespaceId
Input. Identifier for the table space which is to be changed.

NumContainers
Input. The number of rows the structure pointed to by *pContainerData* holds.

pContainerData
Input. Container specifications. Although the *SQLB_TBSCONTQRY_DATA* structure is used, only the *contType*, *totalPages*, *name*, and *nameLen* (for languages other than C) fields are used; all other fields are ignored.

Sample Programs

C	\sqllib\samples\c\backrest.c
COBOL	\sqllib\samples\cobol\backrest.cbl

Usage Notes

This API is used in conjunction with "sqlurestore - Restore Database" on page 381.

A backup of a database, or one or more table spaces, keeps a record of all the table space containers in use by the table spaces being backed up. During a restore, all containers listed in the backup are checked to see if they currently exist and are accessible. If one or more of the containers is inaccessible for any reason, the restore will fail. In order to allow a restore in such a case, the redirecting of table space containers is supported during the restore. This support includes adding, changing, or removing of table space containers. It is this API that allows the user to add, change or remove those containers. For more information, see the *Administration Guide*.

Typical use of this API would involve the following sequence of actions:

1. Invoke "sqlurestore - Restore Database" on page 381 with *CallerAction* set to SQLUD_RESTORE_STORDEF.

   The restore utility returns an *sqlcode* indicating that some of the containers are inaccessible.
2. Invoke **sqlbstsc** to set the table space container definitions with the *SetContainerOptions* parameter set to SQLB_SET_CONT_FINAL_STATE.
3. Invoke **sqlurst** a second time with *CallerAction* set to SQLUD_CONTINUE.

The above sequence will allow the restore to use the new table space container definitions and will ignore table space add container operations in the logs when "sqluroll - Rollforward Database" on page 397 is called after the restore is complete.

The user of this API should be aware that when setting the container list, there must be sufficient disk space to allow for the restore or rollforward operation to replace all of the original data into these new containers. If there is not sufficient space, such table spaces will be left in the *recovery pending* state until sufficient disk space is made available. A prudent Database Administrator will keep records of disk utilization on a regular basis. Then, when a restore or rollforward operation is needed, the required disk space will be known.

See Also

"sqlubkp - Backup Database" on page 290

"sqluroll - Rollforward Database" on page 397

"sqlurestore - Restore Database" on page 381.

sqlbtcq - Tablespace Container Query

Provides a one-call interface to the table space container query data. The query data for all containers in a table space, or for all containers in all table spaces, is returned in an array.

Scope

In a partitioned database server environment, only the table spaces on the current node are listed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlbtcq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    sqluint32 * pNumContainers,
    struct SQLB_TBSCONTQRY_DATA ** ppContainerData);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Tablespace Container Query */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgtcq (
    struct sqlca * pSqlca,
    sqluint32 TablespaceId,
    sqluint32 * pNumContainers,
    struct SQLB_TBSCONTQRY_DATA ** ppContainerData);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

TablespaceId
Input. ID of the table space for which container data is desired, or a special ID, `SQLB_ALL_TABLESPACES` (defined in `sqlutil`), which produces a list of all containers for the entire database.

pNumContainers
Output. The number of containers in the table space.

ppContainerData
Output. The caller supplies the API with the address of a pointer to a *SQLB_TBSCONTQRY_DATA* structure. The space for the table space container query data is allocated by the API, and a pointer to that space is returned to the caller. On return from the call, the pointer to the *SQLB_TBSCONTQRY_DATA* structure points to the complete set of table space container query data.

Sample Programs

C	\sqllib\samples\c\tabscont.sqc
COBOL	\sqllib\samples\cobol\tabscont.sqb

Usage Notes

This API uses the lower level services, namely:

- "sqlbotcq - Open Tablespace Container Query" on page 116
- "sqlbftcq - Fetch Tablespace Container Query" on page 107
- "sqlbctcq - Close Tablespace Container Query" on page 103

to get all of the table space container query data at once.

If sufficient memory is available, this function returns the number of containers, and a pointer to the memory location of the table space container query data. It is the user's responsibility to free this memory with a call to **sqlefmem** (see "sqlefmem - Free Memory" on page 195).

If sufficient memory is not available, this function simply returns the number of containers, and no memory is allocated. If this should happen, use "sqlbotcq - Open Tablespace Container Query" on page 116, "sqlbftcq - Fetch Tablespace Container Query" on page 107, and "sqlbctcq - Close Tablespace Container Query" on page 103 to fetch less than the whole list at once.

See Also

"sqlbctcq - Close Tablespace Container Query" on page 103

"sqlbftcq - Fetch Tablespace Container Query" on page 107

"sqlbotcq - Open Tablespace Container Query" on page 116

"sqlbstsc - Set Tablespace Containers" on page 124

"sqlbtcq - Tablespace Container Query" on page 127.

sqlcspqy - List DRDA Indoubt Transactions

Provides a list of transactions that are indoubt between partner LUs connected by LU 6.2 protocols.

Authorization

sysadm

Required Connection

Instance

API Include File

sqlxa.h

C API Syntax

```
/* File: sqlxa.h */
/* API: List DRDA Indoubt Transactions */
/* ... */
extern int SQL_API_FN sqlcspqy(SQLCSPQY_INDOUBT     **indoubt_data,
                               sqlint32             *indoubt_count,
                               struct sqlca          *sqlca);
/* ... */
```

API Parameters

indoubt_data
Output. A pointer to the returned array.

indoubt_count
Output. The number of elements in the returned array.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

DRDA indoubt transactions occur when communication is lost between coordinators and participants in distributed units of work.

A distributed unit of work lets a user or application read and update data at multiple locations within a single unit of work. Such work requires a two-phase commit.

The first phase requests all the participants to prepare for commit. The second phase commits or rolls back the transactions. If a coordinator or participant becomes unavailable after the first phase then the distributed transactions are indoubt.

Before issuing LIST DRDA INDOUBT TRANSACTIONS, the application process must be connected to the Sync Point Manager (SPM) instance. Use the SPM_NAME as the *dbalias* on the CONNECT statement (see the *SQL Reference* for more information about using CONNECT). SPM_NAME is a database manager configuration parameter.

sqle_activate_db - Activate Database

Activates the specified database and starts up all necessary database services, so that the database is available for connection and use by any application.

Scope

This API activates the specified database on all nodes within the system. If one or more of these nodes encounters an error during activation of the database, a warning is returned. The database remains activated on all nodes on which the API has succeeded.

Note: If it is the coordinator node or the catalog node that encounters the error, the API returns a negative *sqlcode*, and the database will not be activated on any node.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

None. Applications invoking ACTIVATE DATABASE cannot have any existing database connections.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Activate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqle_activate_db (
    char * pDbAlias,
    char * pUserName,
    char * pPassword,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Activate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlg_activate_db (
    unsigned short DbAliasLen,
    unsigned short UserNameLen,
    unsigned short PasswordLen,
    char * pDbAlias,
    char * pUserName,
    char * pPassword,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length of the database alias name in bytes.

UserNameLen
Input. A 2-byte unsigned integer representing the length of the user name in bytes. Set to zero if no user name is supplied.

PasswordLen
Input. A 2-byte unsigned integer representing the length of the password in bytes. Set to zero if no password is supplied.

pDbAlias
Input. Pointer to the database alias name.

pUserName
Input. Pointer to the user ID starting the database. Can be NULL.

pPassword
Input. Pointer to the password for the user name. Can be NULL, but must be specified if a user name is specified.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

If a database has not been started, and a DB2 CONNECT TO (or an implicit connect) is encountered in an application, the application must wait while the database manager starts up the required database. In such cases, this first application spends time on database initialization before it can do any work. However, once the first application has started a database, other applications can simply connect and use it.

Database administrators can use ACTIVATE DATABASE to start up selected databases. This eliminates any application time spent on database initialization.

Databases initialized by ACTIVATE DATABASE can only be shut down by "sqle_deactivate_db - Deactivate Database" on page 135, or by "sqlepstp - Stop Database Manager" on page 233. To obtain a list of activated databases, call "db2GetSnapshot - Get Snapshot" on page 27.

If a database was started by a DB2 CONNECT TO (or an implicit connect) and subsequently an ACTIVATE DATABASE is issued for that same database, then DEACTIVATE DATABASE must be used to shut down that database.

ACTIVATE DATABASE behaves in a similar manner to a DB2 CONNECT TO (or an implicit connect) when working with a database requiring a restart (for example, database in an inconsistent state). The database will be restarted before it can be initialized by ACTIVATE DATABASE.

See Also

"sqle_deactivate_db - Deactivate Database" on page 135.

sqle_deactivate_db - Deactivate Database

Stops the specified database.

Scope

In an MPP system, this API deactivates the specified database on all nodes in the system. If one or more of these nodes encounters an error, a warning is returned. The database will be successfully deactivated on some nodes, but may remain activated on the nodes encountering the error.

Note: If it is the coordinator node or the catalog node that encounters the error, the API returns a negative *sqlcode*, and the database will not be reactivated on any node on which it was deactivated.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

None. Applications invoking DEACTIVATE DATABASE cannot have any existing database connections.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Deactivate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqle_deactivate_db (
    char * pDbAlias,
    char * pUserName,
    char * pPassword,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Deactivate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlg_deactivate_db (
    unsigned short DbAliasLen,
    unsigned short UserNameLen,
    unsigned short PasswordLen,
    char * pDbAlias,
    char * pUserName,
    char * pPassword,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length of the database alias name in bytes.

UserNameLen
Input. A 2-byte unsigned integer representing the length of the user name in bytes. Set to zero if no user name is supplied.

PasswordLen
Input. A 2-byte unsigned integer representing the length of the password in bytes. Set to zero if no password is supplied.

pDbAlias
Input. Pointer to the database alias name.

pUserName
Input. Pointer to the user ID stopping the database. Can be NULL.

pPassword
Input. Pointer to the password for the user name. Can be NULL, but must be specified if a user name is specified.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

Databases initialized by ACTIVATE DATABASE can only be shut down by DEACTIVATE DATABASE. “sqlepstp - Stop Database Manager” on page 233 automatically stops all activated databases before stopping the database manager. If a database was initialized by ACTIVATE DATABASE, the last DB2 CONNECT RESET statement (counter equal 0) will not shut down the database; DEACTIVATE DATABASE must be used.

See Also

“sqle_activate_db - Activate Database” on page 132.

sqleaddn - Add Node

Adds a new node to the parallel database system. This API creates database partitions for all databases currently defined in the MPP server on the new node. The user can specify the source node for any system temporary table spaces to be created with the databases, or specify that no system temporary table spaces are to be created. The API must be issued from the node that is being added, and can only be issued on an MPP server.

Scope

This API only affects the node on which it is executed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Add Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqleaddn (
    void * pAddNodeOptions,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Add Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgaddn (
    unsigned short addnOptionsLen,
    struct sqlca * pSqlca,
    void * pAddNodeOptions);
/* ... */
```

API Parameters

addnOptionsLen
Input. A 2-byte unsigned integer representing the length of the optional *sqle_addn_options* structure in bytes.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pAddNodeOptions
Input. A pointer to the optional *sqle_addn_options* structure. This structure is used to specify the source node, if any, of the system temporary table space definitions for all database partitions created during the add node operation. If not specified (that is, a NULL pointer is specified), the system temporary table space definitions will be the same as those for the catalog node. For more information about this structure, see "SQLE-ADDN-OPTIONS" on page 460.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

Before adding a new node, ensure that there is sufficient storage for the containers that must be created for all existing databases on the system.

The add node operation creates an empty database partition on the new node for every database that exists in the instance. The configuration parameters for the new database partitions are set to the default value.

If an add node operation fails while creating a database partition locally, it enters a clean-up phase, in which it locally drops all databases that have been created. This means that the database partitions are removed only from the node being added (that is, the local node). Existing database partitions remain unaffected on all other nodes. If this fails, no further clean up is done, and an error is returned.

The database partitions on the new node cannot be used to contain user data until after the ALTER NODEGROUP statement has been used to add the node to a nodegroup. For details, see the *SQL Reference*.

This API will fail if a create database or a drop database operation is in progress. The API can be called again once the operation has completed.

If system temporary table spaces are to be created with the database partitions, **sqleaddn** may have to communicate with another node in the MPP

system in order to retrieve the table space definitions. The *start_stop_time* database manager configuration parameter is used to specify the time, in minutes, by which the other node must respond with the table space definitions. If this time is exceeded, the API fails. Increase the value of *start_stop_time*, and call the API again.

See Also

"sqlecrea - Create Database" on page 159

"sqledrpn - Drop Node Verify" on page 191

"sqlepstart - Start Database Manager" on page 230.

sqleatcp - Attach and Change Password

Enables an application to specify the node at which instance-level functions (CREATE DATABASE and FORCE APPLICATION, for example) are to be executed. This node may be the current instance (as defined by the value of the **DB2INSTANCE** environment variable), another instance on the same workstation, or an instance on a remote workstation. Establishes a logical instance attachment to the node specified, and starts a physical communications connection to the node if one does not already exist.

Note: This API extends the function of "sqleatin - Attach" on page 145 by permitting the optional change of the user password for the instance being attached.

Authorization

None

Required Connection

This API establishes an instance attachment.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Attach and Change Password */
/* ... */
SQL_API_RC SQL_API_FN
  sqleatcp (
    char * pNodeName,
    char * pUserName,
    char * pPassword,
    char * pNewPassword,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Attach and Change Password */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgatcp (
    unsigned short NewPasswordLen,
    unsigned short PasswordLen,
    unsigned short UserNameLen,
    unsigned short NodeNameLen,
    struct sqlca * pSqlca,
    char * pNewPassword,
    char * pPassword,
    char * pUserName,
    char * pNodeName);
/* ... */
```

API Parameters

NewPasswordLen
Input. A 2-byte unsigned integer representing the length of the new password in bytes. Set to zero if no new password is supplied.

PasswordLen
Input. A 2-byte unsigned integer representing the length of the password in bytes. Set to zero if no password is supplied.

UserNameLen
Input. A 2-byte unsigned integer representing the length of the user name in bytes. Set to zero if no user name is supplied.

NodeNameLen
Input. A 2-byte unsigned integer representing the length of the node name in bytes. Set to zero if no node name is supplied.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNewPassword
Input. A string containing the new password for the specified user name. Set to NULL if a password change is not required.

pPassword
Input. A string containing the password for the specified user name. May be NULL.

pUserName
Input. A string containing the user name under which the attachment is to be authenticated. May be NULL.

pNodeName
Input. A string containing the alias of the instance to which the user wants to attach. This instance must have a matching entry in the local node directory. The only exception is the local instance (as specified by the **DB2INSTANCE** environment variable), which can be specified as the object of an attachment, but cannot be used as a node name in the node directory. May be NULL.

REXX API Syntax

Calling this API directly from REXX is not supported. However, REXX programmers can utilize this function by calling the DB2 command line processor to execute the ATTACH command. For more information, see the REXX programming chapter in the *Application Development Guide*.

Sample Programs

C	\sqllib\samples\c\dbinst.c
COBOL	\sqllib\samples\cobol\dbinst.cbl

Usage Notes

Note: A node name in the node directory can be regarded as an alias for an instance.

If an attach request succeeds, the *sqlerrmc* field of the *sqlca* will contain 9 tokens separated by hexadecimal FF (similar to the tokens returned when a CONNECT request is successful):

1. Country code of the application server
2. Code page of the application server
3. Authorization ID
4. Node name (as specified on the API)
5. Identity and platform type of the server (see the *SQL Reference*).
6. Agent ID of the agent which has been started at the server
7. Agent index
8. Node number of the server
9. Number of partitions if the server is a partitioned database server.

If the node name is a zero-length string or NULL, information about the current state of attachment is returned. If no attachment exists, sqlcode 1427 is returned. Otherwise, information about the attachment is returned in the *sqlerrmc* field of the *sqlca* (as outlined above).

If an attachment has not been made, instance-level APIs are executed against the current instance, specified by the **DB2INSTANCE** environment variable.

Certain functions (**db2start**, **db2stop**, and all directory services, for example) are never executed remotely. That is, they affect only the local instance environment, as defined by the value of the **DB2INSTANCE** environment variable.

If an attachment exists, and the API is issued with a node name, the current attachment is dropped, and an attachment to the new node is attempted.

Where the user name and password are authenticated, and where the password is changed, depend on the authentication type of the target instance. For detailed information about authentication types, see the *Administration Guide*.

The node to which an attachment is to be made can also be specified by a call to "sqlesetc - Set Client" on page 248 (see the SQL_ATTACH_NODE option in "SQLE-CONN-SETTING" on page 465).

See Also

"sqleatin - Attach" on page 145

"sqledtin - Detach" on page 193

"sqlesetc - Set Client" on page 248.

sqleatin - Attach

Enables an application to specify the node at which instance-level functions (CREATE DATABASE and FORCE APPLICATION, for example) are to be executed. This node may be the current instance (as defined by the value of the **DB2INSTANCE** environment variable), another instance on the same workstation, or an instance on a remote workstation. Establishes a logical instance attachment to the node specified, and starts a physical communications connection to the node if one does not already exist.

Note: If a password change is required, use "sqleatcp - Attach and Change Password" on page 141 instead of **sqleatin**.

Authorization

None

Required Connection

This API establishes an instance attachment.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Attach */
/* ... */
SQL_API_RC SQL_API_FN
  sqleatin (
    char * pNodeName,
    char * pUserName,
    char * pPassword,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Attach */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgatin (
    unsigned short PasswordLen,
    unsigned short UserNameLen,
    unsigned short NodeNameLen,
    struct sqlca * pSqlca,
    char * pPassword,
    char * pUserName,
    char * pNodeName);
/* ... */
```

API Parameters

PasswordLen
Input. A 2-byte unsigned integer representing the length of the password in bytes. Set to zero if no password is supplied.

UserNameLen
Input. A 2-byte unsigned integer representing the length of the user name in bytes. Set to zero if no user name is supplied.

NodeNameLen
Input. A 2-byte unsigned integer representing the length of the node name in bytes. Set to zero if no node name is supplied.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pPassword
Input. A string containing the password for the specified user name. May be NULL.

pUserName
Input. A string containing the user name under which the attachment is to be authenticated. May be NULL.

pNodeName
Input. A string containing the alias of the instance to which the user wants to attach. This instance must have a matching entry in the local node directory. The only exception is the local instance (as specified by the **DB2INSTANCE** environment variable), which can be specified as the object of an attachment, but cannot be used as a node name in the node directory. May be NULL.

REXX API Syntax

```
ATTACH [TO nodename [USER username USING password]]
```

REXX API Parameters

nodename
Alias of the instance to which the user wants to attach. This instance must have a matching entry in the local node directory. The only exception is the local instance (as specified by the **DB2INSTANCE** environment variable), which can be specified as the object of an attachment, but cannot be used as a node name in the node directory.

username
Name under which the user attaches to the instance.

password
Password used to authenticate the user name.

Sample Programs

C	\sqllib\samples\c\dbinst.c
COBOL	\sqllib\samples\cobol\dbinst.cbl
REXX	\sqllib\samples\rexx\dbinst.cmd

Usage Notes

Note: A node name in the node directory can be regarded as an alias for an instance.

If an attach request succeeds, the *sqlerrmc* field of the *sqlca* will contain 9 tokens separated by hexadecimal FF (similar to the tokens returned when a CONNECT request is successful):

1. Country code of the application server
2. Code page of the application server
3. Authorization ID
4. Node name (as specified on the API)
5. Identity and platform type of the server (see the *SQL Reference*).
6. Agent ID of the agent which has been started at the server
7. Agent index
8. Node number of the server
9. Number of partitions if the server is a partitioned database server.

If the node name is a zero-length string or NULL, information about the current state of attachment is returned. If no attachment exists, sqlcode 1427 is returned. Otherwise, information about the attachment is returned in the *sqlerrmc* field of the *sqlca* (as outlined above).

If an attachment has not been made, instance-level APIs are executed against the current instance, specified by the **DB2INSTANCE** environment variable.

Certain functions (**db2start**, **db2stop**, and all directory services, for example) are never executed remotely. That is, they affect only the local instance environment, as defined by the value of the **DB2INSTANCE** environment variable.

If an attachment exists, and the API is issued with a node name, the current attachment is dropped, and an attachment to the new node is attempted.

Where the user name and password are authenticated depends on the authentication type of the target instance. For detailed information about authentication types, see the *Administration Guide*.

The node to which an attachment is to be made can also be specified by a call to "sqlesetc - Set Client" on page 248 (see the SQL_ATTACH_NODE option in "SQLE-CONN-SETTING" on page 465).

See Also

"sqleatcp - Attach and Change Password" on page 141

"sqledtin - Detach" on page 193

"sqlesetc - Set Client" on page 248.

sqlecadb - Catalog Database

Stores database location information in the system database directory. The database can be located either on the local workstation or on a remote node.

Scope

This API affects the system database directory. In a partitioned database environment, when cataloging a local database into the system database directory, this API must be called from a node on the server where the database resides.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Catalog Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlecadb (
    _SQLOLDCHAR * pDbName,
    _SQLOLDCHAR * pDbAlias,
    unsigned char Type,
    _SQLOLDCHAR * pNodeName,
    _SQLOLDCHAR * pPath,
    _SQLOLDCHAR * pComment,
    unsigned short Authentication,
    _SQLOLDCHAR * pPrincipal,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Catalog Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgcadb (
    unsigned short PrinLen,
    unsigned short CommentLen,
    unsigned short PathLen,
    unsigned short NodeNameLen,
    unsigned short DbAliasLen,
    unsigned short DbNameLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pPrinName,
    unsigned short Authentication,
    _SQLOLDCHAR * pComment,
    _SQLOLDCHAR * pPath,
    _SQLOLDCHAR * pNodeName,
    unsigned char Type,
    _SQLOLDCHAR * pDbAlias,
    _SQLOLDCHAR * pDbName);
/* ... */
```

API Parameters

PrinLen
Input. A 2-byte unsigned integer representing the length in bytes of the principal name. Set to zero if no principal is provided. This value should be nonzero only when authentication is specified as SQL_AUTHENTICATION_DCE or SQL_AUTHENTICATION_KERBEROS.

CommentLen
Input. A 2-byte unsigned integer representing the length in bytes of the comment. Set to zero if no comment is provided.

PathLen
Input. A 2-byte unsigned integer representing the length in bytes of the path of the local database directory. Set to zero if no path is provided.

NodeNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the node name. Set to zero if no node name is provided.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

DbNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the database name.

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pPrinName

Input. A string containing the principal name of the DB2 server on which the database resides. This value should only be specified when authentication is `SQL_AUTHENTICATION_DCE` or `SQL_AUTHENTICATION_KERBEROS`. For DCE, the principal must be the same as the value stored in the server's keytab file.

Authentication

Input. Contains the authentication type specified for the database. Authentication is a process that verifies that the user is who he/she claims to be. Access to database objects depends on the user's authentication. Valid values (from `sqlenv`) are:

SQL_AUTHENTICATION_SERVER
Specifies that authentication takes place on the node containing the target database.

SQL_AUTHENTICATION_CLIENT
Specifies that authentication takes place on the node where the application is invoked.

SQL_AUTHENTICATION_DCS
Specifies that authentication takes place on the node containing the target database, except when using DB2 Connect, when it specifies that authentication takes place at the DRDA AS.

SQL_AUTHENTICATION_DCE
Specifies that authentication takes place using DCE Security Services.

SQL_AUTHENTICATION_KERBEROS
Specifies that authentication takes place using Kerberos Security Mechanism.

SQL_AUTHENTICATION_NOT_SPECIFIED
Authentication not specified.

SQL_AUTHENTICATION_SVR_ENCRYPT
Specifies that authentication takes place on the node containing the target database, and that the authentication password is to be encrypted.

SQL_AUTHENTICATION_DCS_ENCRYPT
Specifies that authentication takes place on the node containing the target database except when using DB2

Connect, in which case authentication takes place at the DRDA AS. Also, the authentication password is to be encrypted.

This parameter can be set to SQL_AUTHENTICATION_NOT_SPECIFIED, except when cataloging a database that resides on a DB2 Version 1 server.

Specifying the authentication type in the database catalog results in a performance improvement during a connect.

For more information about authentication types, see the *Administration Guide*.

pComment
Input. A string containing an optional description of the database. A null string indicates no comment. The maximum length of a comment string is 30 characters.

pPath Input. A string which, on UNIX based systems, specifies the name of the path on which the database being cataloged resides. Maximum length is 215 characters.

On OS/2 or the Windows operating system, this string specifies the letter of the drive on which the database being cataloged resides.

If a NULL pointer is provided, the default database path is assumed to be that specified by the database manager configuration parameter *dftdbpath*.

pNodeName
Input. A string containing the name of the node where the database is located. May be NULL.

Note: If neither *pPath* nor *pNodeName* is specified, the database is assumed to be local, and the location of the database is assumed to be that specified in the database manager configuration parameter *dftdbpath*.

Type Input. A single character that designates whether the database is indirect, remote, or is cataloged via DCE. Valid values (defined in sqlenv) are:

SQL_INDIRECT
Specifies that the database resides at this instance.

SQL_REMOTE
Specifies that the database resides at another instance.

SQL_DCE
Specifies that the database is cataloged via DCE.

pDbAlias
Input. A string containing an alias for the database.

pDbName
Input. A string containing the database name.

REXX API Syntax

```
CATALOG DATABASE dbname [AS alias] [ON path|AT NODE nodename]
[AUTHENTICATION authentication] [WITH "comment"]
```

REXX API Parameters

dbname
Name of the database to be cataloged.

alias Alternate name for the database. If an alias is not specified, the database name is used as the alias.

path Path on which the database being cataloged resides.

nodename
Name of the remote workstation where the database being cataloged resides.

Note: If neither *path* nor *nodename* is specified, the database is assumed to be local, and the location of the database is assumed to be that specified in the database manager configuration parameter *dftdbpath*.

authentication
Place where authentication is to be done. Valid values are:

SERVER
Authentication occurs at the node containing the target database. This is the default.

CLIENT
Authentication occurs at the node where the application is invoked.

DCS Specifies how authentication will take place for databases accessed using DB2 Connect. The behavior is the same as for the type SERVER, except that when the authentication type is SERVER, DB2 Connect forces authentication at the gateway, and when the authentication type is DCS, authentication is assumed to take place at the host.

DCE SERVER PRINCIPAL *dce_principal_name*
Fully qualified DCE principal name for the target server. This value is also recorded in the keytab file at the target server.

comment
Describes the database or the database entry in the system database directory. The maximum length of a comment string is 30 characters. A carriage return or a line feed character is not permitted. The comment text must be enclosed by double quotation marks.

REXX API Syntax

```
CATALOG GLOBAL DATABASE db_global_name AS alias
USING DIRECTORY {DCE} [WITH comment]
```

REXX API Parameters

db_global_name
The fully qualified name that uniquely identifies the database in the DCE name space.

alias Alternate name for the database.

DCE The global directory service being used.

comment
Describes the database or the database entry in the system database directory. The maximum length of a comment string is 30 characters. A carriage return or a line feed character is not permitted. The comment text must be enclosed by double quotation marks.

Examples

```
call SQLDBS 'CATALOG GLOBAL DATABASE /.../cell1/subsys/database/DB3
AS dbtest USING DIRECTORY DCE WITH "Sample Database"'
```

Sample Programs

C	\sqllib\samples\c\dbcat.c
COBOL	\sqllib\samples\cobol\dbcat.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

Usage Notes

Use CATALOG DATABASE to catalog databases located on local or remote nodes, recatalog databases that were uncataloged previously, or maintain multiple aliases for one database (regardless of database location).

DB2 automatically catalogs databases when they are created. It catalogs an entry for the database in the local database directory, and another entry in the system database directory. If the database is created from a remote client (or a

client which is executing from a different instance on the same machine), an entry is also made in the system database directory at the client instance.

Databases created at the current instance (as defined by the value of the **DB2INSTANCE** environment variable) are cataloged as *indirect*. Databases created at other instances are cataloged as *remote* (even if they physically reside on the same machine).

CATALOG DATABASE automatically creates a system database directory if one does not exist. The system database directory is stored on the path that contains the database manager instance that is being used. The system database directory is maintained outside of the database. Each entry in the directory contains:

- Alias
- Authentication type
- Comment
- Database
- Entry type
- Local database directory (when cataloging a local database)
- Node name (when cataloging a remote database)
- Release information.

If a database is cataloged with the type parameter set to `SQL_INDIRECT`, the value of the authentication parameter provided will be ignored, and the authentication in the directory will be set to `SQL_AUTHENTICATION_NOT_SPECIFIED`.

List the contents of the system database directory using "sqledosd - Open Database Directory Scan" on page 181, "sqledgne - Get Next Database Directory Entry" on page 178, and "sqledcls - Close Database Directory Scan" on page 176.

If directory caching is enabled (see the configuration parameter *dir_cache* in "sqlfxsys - Get Database Manager Configuration" on page 278), database, node, and DCS directory files are cached in memory. An application's directory cache is created during its first directory lookup. Since the cache is only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

See Also

"sqledcls - Close Database Directory Scan" on page 176

"sqledgne - Get Next Database Directory Entry" on page 178

"sqledosd - Open Database Directory Scan" on page 181

"sqleuncd - Uncatalog Database" on page 254.

sqlecran - Create Database at Node

Creates a database only on the node that calls the API. This API is not intended for general use. For example, it should be used with "sqlurestore - Restore Database" on page 381 if the database partition at a node was damaged and must be recreated. Improper use of this API can cause inconsistencies in the system, so it should only be used with caution.

Note: If this API is used to recreate a database partition that was dropped (because it was damaged), the database at this node will be in the restore-pending state. After recreating the database partition, the database must immediately be restored on this node.

Scope

This API only affects the node on which it is called.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Instance. To create a database at another node, it is necessary to first attach to that node. A database connection is temporarily established by this API during processing.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Create Database at Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlecran (
    char * pDbName,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

sqlecran - Create Database at Node

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Create Database at Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgcran (
    unsigned short reservedLen,
    unsigned short dbNameLen,
    struct sqlca * pSqlca,
    void * pReserved,
    char * pDbName);
/* ... */
```

API Parameters

reservedLen
Input. Reserved for the length of *pReserved*.

dbNameLen
Input. A 2-byte unsigned integer representing the length of the database name in bytes.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pReserved
Input. A spare pointer that is set to null or points to zero. Reserved for future use.

pDbName
Input. A string containing the name of the database to be created. Must not be NULL.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

When the database is successfully created, it is placed in restore-pending state. The database must be restored on this node before it can be used.

See Also

"sqlecrea - Create Database" on page 159

"sqledpan - Drop Database at Node" on page 184.

sqlecrea - Create Database

Initializes a new database with an optional user-defined collating sequence, creates the three initial table spaces, creates the system tables, and allocates the recovery log.

Scope

In a multi-node environment, this API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file.

The node from which this API is called becomes the catalog node for the new database.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Instance. To create a database at another (remote) node, it is necessary to first attach to that node. A database connection is temporarily established by this API during processing.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Create Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlecrea (
    char * pDbName,
    char * pLocalDbAlias,
    char * pPath,
    struct sqledbdesc * pDbDescriptor,
    struct sqledbcountryinfo * pCountryInfo,
    char Reserved2,
    void * pReserved1,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Create Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgcrea (
    unsigned short PathLen,
    unsigned short LocalDbAliasLen,
    unsigned short DbNameLen,
    struct sqlca * pSqlca,
    void * pReserved1,
    unsigned short Reserved2,
    struct sqledbcountryinfo * pCountryInfo,
    struct sqledbdesc * pDbDescriptor,
    char * pPath,
    char * pLocalDbAlias,
    char * pDbName);
/* ... */
```

API Parameters

PathLen
Input. A 2-byte unsigned integer representing the length of the path in bytes. Set to zero if no path is provided.

LocalDbALiasLen
Input. A 2-byte unsigned integer representing the length of the local database alias in bytes. Set to zero if no local alias is provided.

DbNameLen
Input. A 2-byte unsigned integer representing the length of the database name in bytes.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pReserved1
Input. A spare pointer that is set to null or points to zero.

Reserved2
Input. Reserved for future use.

pCountryInfo
Input. A pointer to the *sqledbcountryinfo* structure, containing the locale and the code set for the database. For more information about this structure, see "SQLEDBCOUNTRYINFO" on page 484. For a list of valid locale and code set values, see one of the *Quick Beginnings* books. May be NULL.

pDbDescriptor
Input. A pointer to the database description block used when creating

the database. The database description block may be used to supply values that are permanently stored in the configuration file of the database, such as collating sequence. Its structure is described in "SQLEDBDESC" on page 485. May be NULL.

pPath Input. On UNIX based systems, specifies the path on which to create the database. If a path is not specified, the database is created on the default database path specified in the database manager configuration file (*dftdbpath* parameter). On OS/2 or the Windows operating system, specifies the letter of the drive on which to create the database. May be NULL.

Note: For MPP systems, a database should not be created in an NFS-mounted directory. If a path is not specified, ensure that the *dftdbpath* database manager configuration parameter is not set to an NFS-mounted path (for example, on UNIX based systems, it should not specify the `$HOME` directory of the instance owner). The path specified for this API in an MPP system cannot be a relative path.

pLocalDbAlias
Input. A string containing the alias to be placed in the client's system database directory. May be NULL. If no local alias is specified, the database name is the default.

pDbName
Input. A string containing the database name. This is the database name that will be cataloged in the system database directory. Once the database has been successfully created in the server's system database directory, it is automatically cataloged in the system database directory with a database alias identical to the database name. Must not be NULL.

REXX API Syntax

```
CREATE DATABASE dbname [ON path] [ALIAS dbalias]
[USING CODESET codeset TERRITORY territory]
[COLLATE USING {SYSTEM | IDENTITY | USER :udcs}]
[NUMSEGS numsegs] [DFT_EXTENT_SZ dft_extentsize]
[CATALOG TABLESPACE <tablespace_definition>]
[USER TABLESPACE <tablespace_definition>]
[TEMPORARY TABLESPACE <tablespace_definition>]
[WITH comment]

Where <tablespace_definition> stands for:
MANAGED BY {
SYSTEM USING :SMS_string |
DATABASE USING :DMS_string }
[ EXTENTSIZE number_of_pages ]
[ PREFETCHSIZE number_of_pages ]
[ OVERHEAD number_of_milliseconds ]
[ TRANSFERRATE number_of_milliseconds ]
```

REXX API Parameters

dbname
Name of the database.

dbalias
Alias of the database.

path Path on which to create the database.

If a path is not specified, the database is created on the default database path specified in the database manager configuration file (*dftdbpath* configuration parameter).

Note: For MPP systems, a database should not be created in an NFS-mounted directory. If a path is not specified, ensure that the *dftdbpath* database manager configuration parameter is not set to an NFS-mounted path (for example, on UNIX based systems, it should not specify the `$HOME` directory of the instance owner). The path specified for this API in an MPP system cannot be a relative path.

codeset
Code set to be used for data entered into the database.

territory
Territory code (locale) to be used for data entered into the database.

SYSTEM
Uses the collating sequence of the operating system based on the current country code.

IDENTITY
The collating sequence is the identity sequence, where strings are compared byte for byte, starting with the leftmost byte.

USER udcs
The collating sequence is specified by the calling application in a host variable containing a 256-byte string defining the collating sequence.

numsegs
Number of segment directories that will be created and used to store the DAT, IDX, and LF files.

dft_extentsize
Specifies the default *extentsize* for table spaces in the database.

SMS_string
A compound REXX host variable identifying one or more containers that will belong to the table space, and where the table space data will be stored. In the following, XXX represents the host variable name. Note that each of the directory names cannot exceed 254 bytes in length.

XXX.0 Number of directories specified

XXX.1 First directory name for SMS table space

XXX.2 Second directory name for SMS table space

XXX.3 and so on.

DMS_string
A compound REXX host variable identifying one or more containers that will belong to the table space, where the table space data will be stored, container sizes (specified in a number of 4KB pages) and types (file or device). The specified devices (not files) must already exist. In the following, XXX represents the host variable name. Note that each of the container names cannot exceed 254 bytes in length.

XXX.0 Number of strings in the REXX host variable (number of first level elements)

XXX.1.1
Type of the first container (`file` or `device`)

XXX.1.2
First file name or device name

XXX.1.3
Size (in pages) of the first container

XXX.2.1
Type of the second container (`file` or `device`)

XXX.2.2
Second file name or device name

XXX.2.3
Size (in pages) of the second container

XXX.3.1
and so on.

EXTENTSIZE number_of_pages
Number of 4KB pages that will be written to a container before skipping to the next container.

PREFETCHSIZE number_of_pages
Number of 4KB pages that will be read from the table space when data prefetching is being performed.

OVERHEAD number_of_milliseconds
Number that specifies the I/O controller overhead, disk seek, and latency time in milliseconds.

TRANSFERRATE number_of_milliseconds
Number that specifies the time in milliseconds to read one 4KB page into memory.

comment
Description of the database or the database entry in the system directory. Do not use a carriage return or line feed character in the comment. Be sure to enclose the comment text in double quotation marks. Maximum size is 30 characters.

Sample Programs

C	\sqllib\samples\c\dbconf.c
COBOL	\sqllib\samples\cobol\dbconf.cbl
REXX	\sqllib\samples\rexx\dbconf.cmd

Usage Notes

CREATE DATABASE:

- Creates a database in the specified subdirectory. In an MPP system, creates the database on all nodes listed in `db2nodes.cfg`, and creates a `$DB2INSTANCE/NODE`*xxxx* directory under the specified subdirectory at each node, where *xxxx* represents the local node number. In a non-MPP system, creates a `$DB2INSTANCE/NODE0000` directory under the specified subdirectory.
- Creates the system catalog tables and recovery log.
- Catalogs the database in the following database directories:
  - server's local database directory on the path indicated by *pPath* or, if the path is not specified, the default database path defined in the database

manager system configuration file. A local database directory resides on each file system that contains a database.

– server's system database directory for the attached instance. The resulting directory entry will contain the database name and a database alias.

  If the API was called from a remote client, the client's system database directory is also updated with the database name and an alias.

Creates a system or a local database directory if neither exists. If specified, the comment and code set values are placed in both directories.

- Stores the specified code set, territory, and collating sequence. A flag is set in the database configuration file if the collating sequence consists of unique weights, or if it is the identity sequence.
- Creates the schemata called SYSCAT, SYSFUN, SYSIBM, and SYSSTAT with SYSIBM as the owner. The server node on which this API is called becomes the catalog node for the new database. Two nodegroups are created automatically: IBMDEFAULTGROUP and IBMCATGROUP. For more information, see the *SQL Reference*.
- Binds the previously defined database manager bind files to the database (these are listed in `db2ubind.lst`). If one or more of these files do not bind successfully, **sqlecrea** returns a warning in the SQLCA, and provides information about the binds that failed. If a bind fails, the user can take corrective action and manually bind the failing file. The database is created in any case. A schema called NULLID is implicitly created when performing the binds with CREATEIN privilege granted to PUBLIC.
- Creates SYSCATSPACE, TEMPSPACE1, and USERSPACE1 table spaces. The SYSCATSPACE table space is only created on the catalog node. All nodes have the same table space definitions.
- Grants the following:
  – DBADM authority, and CONNECT, CREATETAB, BINDADD, CREATE_NOT_FENCED, IMPLICIT_SCHEMA, and LOAD privileges to the database creator
  – CONNECT, CREATETAB, BINDADD, and IMPLICIT_SCHEMA privileges to PUBLIC
  – USE privilege on the USERSPACE1 table space to PUBLIC
  – SELECT privilege on each system catalog to PUBLIC
  – BIND and EXECUTE privilege to PUBLIC for each successfully bound utility.

With *dbadm* authority, one can grant these privileges to (and revoke them from) other users or PUBLIC. If another administrator with *sysadm* or *dbadm* authority over the database revokes these privileges, the database creator nevertheless retains them.

In an MPP environment, the database manager creates a subdirectory, $DB2INSTANCE/NODE*xxxx*, under the specified or default path on all nodes. The *xxxx* is the node number as defined in the db2nodes.cfg file (that is, node 0 becomes NODE0000). Subdirectories SQL00001 through SQL*nnnnn* will reside on this path. This ensures that the database objects associated with different nodes are stored in different directories (even if the subdirectory $DB2INSTANCE under the specified or default path is shared by all nodes).

CREATE DATABASE will fail if the application is already connected to a database.

If the database description block structure is not set correctly, an error message is returned (see "SQLEDBDESC" on page 485).

The "eye-catcher" of the database description block must be set to the symbolic value SQLE_DBDESC_2 (defined in sqlenv). The following sample user-defined collating sequences are available in the host language include files:

sqle819a If the code page of the database is 819 (ISO Latin/1), this sequence will cause sorting to be performed according to the host CCSID 500 (EBCDIC International).

sqle819b If the code page of the database is 819 (ISO Latin/1), this sequence will cause sorting to be performed according to the host CCSID 037 (EBCDIC US English).

sqle850a If the code page of the database is 850 (ASCII Latin/1), this sequence will cause sorting to be performed according to the host CCSID 500 (EBCDIC International).

sqle850b If the code page of the database is 850 (ASCII Latin/1), this sequence will cause sorting to be performed according to the host CCSID 037 (EBCDIC US English).

sqle932a If the code page of the database is 932 (ASCII Japanese), this sequence will cause sorting to be performed according to the host CCSID 5035 (EBCDIC Japanese).

sqle932b If the code page of the database is 932 (ASCII Japanese), this sequence will cause sorting to be performed according to the host CCSID 5026 (EBCDIC Japanese).

The collating sequence specified during CREATE DATABASE cannot be changed later, and all character comparisons in the database use the specified collating sequence. This affects the structure of indexes as well as the results of queries.

Use **sqlecadb** to define different alias names for the new database.

See Also

"sqlabndx - Bind" on page 85

"sqlecadb - Catalog Database" on page 149

"sqlecran - Create Database at Node" on page 157

"sqledpan - Drop Database at Node" on page 184

"sqledrpd - Drop Database" on page 188.

sqlectnd - Catalog Node

Stores information in the node directory about the location of a DB2 server instance based on the communications protocol used to access that instance. The information is needed to establish a database connection or attachment between an application and a server instance.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Catalog Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlectnd (
    struct sqle_node_struct * pNodeInfo,
    void * pProtocolInfo,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Catalog Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgctnd (
    struct sqlca * pSqlca,
    struct sqle_node_struct * pNodeInfo,
    void * pProtocolInfo);
/* ... */
```

API Parameters

pNodeInfo
Input. A pointer to a node directory structure. For more information about this structure, see "SQLE-NODE-STRUCT" on page 476.

pProtocolInfo
Input. A pointer to the protocol structure. For more information about these structures, see:

- "SQLE-NODE-CPIC" on page 471
- "SQLE-NODE-IPXSPX" on page 472
- "SQLE-NODE-LOCAL" on page 473
- "SQLE-NODE-NETB" on page 474
- "SQLE-NODE-NPIPE" on page 475
- "SQLE-NODE-TCPIP" on page 478.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
CATALOG APPC NODE nodename DESTINATION symbolic_destination_name
[SECURITY {NONE|SAME|PROGRAM}]
[WITH comment]
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

symbolic_destination_name
Symbolic destination name of the remote partner node.

comment
An optional description associated with this node directory entry. Do not include a CR/LF character in a comment. Maximum length is 30 characters. The comment text must be enclosed by double quotation marks.

REXX API Syntax

```
CATALOG IPXSPX NODE nodename REMOTE file_server SERVER objectname
[WITH comment]
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

file_server
Name of the NetWare file server where the internetwork address of the database manager instance is registered. The internetwork address is stored in the bindery at the NetWare file server, and is accessed using *objectname*.

objectname
The database manager server instance is represented as the object,

objectname, on the NetWare file server. The server's IPX/SPX internetwork address is stored and retrieved from this object.

comment
An optional description associated with this node directory entry. Do not include a CR/LF character in a comment. Maximum length is 30 characters. The comment text must be enclosed by double quotation marks.

REXX API Syntax

```
CATALOG LOCAL NODE nodename INSTANCE instance_name [WITH comment]
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

instance_name
Name of the instance to be cataloged.

comment
An optional description associated with this node directory entry. Do not include a CR/LF character in a comment. Maximum length is 30 characters. The comment text must be enclosed by double quotation marks.

REXX API Syntax

```
CATALOG NETBIOS NODE nodename REMOTE server_nname ADAPTER adapternum
[WITH comment]
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

server_nname
Name of the remote workstation. This is the workstation name (*nname*) found in the database manager configuration file of the server instance.

adapternum
Local LAN adapter number.

comment
An optional description associated with this node directory entry. Do not include a CR/LF character in a comment. Maximum length is 30 characters. The comment text must be enclosed by double quotation marks.

REXX API Syntax

```
CATALOG NPIPE NODE nodename REMOTE computer_name INSTANCE instance_name
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

computer_name
The computer name of the node on which the target database resides.

instance_name
Name of the instance to be cataloged.

REXX API Syntax

```
CATALOG TCPIP NODE nodename REMOTE hostname SERVER servicename
[WITH comment]
```

REXX API Parameters

nodename
Alias for the node to be cataloged.

hostname
Host name of the node where the target database resides.

servicename
Either the service name of the database manager instance on the remote node, or the port number associated with that service name.

comment
An optional description associated with this node directory entry. Do not include a CR/LF character in a comment. Maximum length is 30 characters. The comment text must be enclosed by double quotation marks.

Sample Programs

C	\sqllib\samples\c\nodecat.c
COBOL	\sqllib\samples\cobol\nodecat.cbl
REXX	\sqllib\samples\rexx\nodecat.cmd

Usage Notes

DB2 creates the node directory on the first call to this API if the node directory does not exist. On OS/2 or the Windows operating system, the node directory is stored in the directory of the instance being used. On UNIX based systems, it is stored in the DB2 install directory (`sqllib`, for example).

If directory caching is enabled (see the configuration parameter *dir_cache* in "sqlfxsys - Get Database Manager Configuration" on page 278), database, node, and DCS directory files are cached in memory. An application's directory cache is created during its first directory lookup. Since the cache is only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

To list the contents of the node directory, use "sqlenops - Open Node Directory Scan" on page 228, "sqlengne - Get Next Node Directory Entry" on page 225, and "sqlencls - Close Node Directory Scan" on page 223.

See Also

"sqlencls - Close Node Directory Scan" on page 223

"sqlengne - Get Next Node Directory Entry" on page 225

"sqlenops - Open Node Directory Scan" on page 228

"sqleuncn - Uncatalog Node" on page 257.

sqledcgd - Change Database Comment

Changes a database comment in the system database directory or the local database directory. New comment text can be substituted for text currently associated with a comment.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Change Database Comment */
/* ... */
SQL_API_RC SQL_API_FN
  sqledcgd (
    _SQLOLDCHAR * pDbAlias,
    _SQLOLDCHAR * pPath,
    _SQLOLDCHAR * pComment,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Change Database Comment */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdcgd (
    unsigned short CommentLen,
    unsigned short PathLen,
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pComment,
    _SQLOLDCHAR * pPath,
    _SQLOLDCHAR * pDbAlias);
/* ... */
```

API Parameters

CommentLen
Input. A 2-byte unsigned integer representing the length in bytes of the comment. Set to zero if no comment is provided.

PathLen
Input. A 2-byte unsigned integer representing the length in bytes of the path parameter. Set to zero if no path is provided.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pComment
Input. A string containing an optional description of the database. A null string indicates no comment. It can also indicate no change to an existing database comment.

pPath Input. A string containing the path on which the local database directory resides. If the specified path is a null pointer, the system database directory is used.

The comment is only changed in the local database directory or the system database directory on the node on which the API is executed. To change the database comment on all nodes, run the API on every node.

pDbAlias
Input. A string containing the database alias. This is the name that is cataloged in the system database directory, or the name cataloged in the local database directory if the path is specified.

REXX API Syntax

```
CHANGE DATABASE database_alias COMMENT [ON path] WITH comment
```

REXX API Parameters

database_alias
Alias of the database whose comment is to be changed.

To change the comment in the system database directory, it is necessary to specify the database alias.

If the path where the database resides is specified (with the *path* parameter), enter the name (not the alias) of the database. Use this method to change the comment in the local database directory.

path Path on which the database resides.

comment
Describes the entry in the system database directory or the local database directory. Any comment that helps to describe the cataloged database can be entered. The maximum length of a comment string is 30 characters. A carriage return or a line feed character is not permitted. The comment text must be enclosed by double quotation marks.

Sample Programs

C	\sqllib\samples\c\dbcmt.c
COBOL	\sqllib\samples\cobol\dbcmt.cbl
REXX	\sqllib\samples\rexx\dbcmt.cmd

Usage Notes

New comment text replaces existing text. To append information, enter the old comment text, followed by the new text.

To modify an existing comment:

1. Call "sqledosd - Open Database Directory Scan" on page 181
2. Call "sqledgne - Get Next Database Directory Entry" on page 178 to retrieve the old comment
3. Modify the retrieved comment
4. Call "sqledcls - Close Database Directory Scan" on page 176
5. Call "sqledcgd - Change Database Comment" to replace the old text with the modified text.

Only the comment for an entry associated with the database alias is modified. Other entries with the same database name, but with different aliases, are not affected.

If the path is specified, the database alias must be cataloged in the local database directory. If the path is not specified, the database alias must be cataloged in the system database directory.

See Also

"sqlecrea - Create Database" on page 159

"sqlecadb - Catalog Database" on page 149.

sqledcls - Close Database Directory Scan

Frees the resources allocated by "sqledosd - Open Database Directory Scan" on page 181.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Close Database Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqledcls (
    unsigned short Handle,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Close Database Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdcls (
    unsigned short Handle,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Handle
Input. Identifier returned from the associated OPEN DATABASE DIRECTORY SCAN API.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
CLOSE DATABASE DIRECTORY scanid
```

REXX API Parameters

scanid A host variable containing the *scanid* returned from the OPEN DATABASE DIRECTORY SCAN API.

Sample Programs

C	\sqllib\samples\c\dbcat.c
COBOL	\sqllib\samples\cobol\dbcat.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

See Also

"sqledgne - Get Next Database Directory Entry" on page 178

"sqledosd - Open Database Directory Scan" on page 181.

sqledgne - Get Next Database Directory Entry

Returns the next entry in the system database directory or the local database directory copy returned by "sqledosd - Open Database Directory Scan" on page 181. Subsequent calls to this API return additional entries.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Get Next Database Directory Entry */
/* ... */
SQL_API_RC SQL_API_FN
  sqledgne (
    unsigned short Handle,
    struct sqledinfo ** ppDbDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Get Next Database Directory Entry */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdgne (
    unsigned short Handle,
    struct sqledinfo ** ppDbDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Handle
Input. Identifier returned from the associated OPEN DATABASE DIRECTORY SCAN API.

ppDbDirEntry
Output. The caller supplies the API with the address of a pointer to an *sqledinfo* structure. The space for the directory data is allocated by the API, and a pointer to that space is returned to the caller. A call to

"sqledcls - Close Database Directory Scan" on page 176 frees the allocated space. Information returned to the buffer is described in "SQLEDINFO" on page 493.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
GET DATABASE DIRECTORY ENTRY :scanid [USING :value]
```

REXX API Parameters

scanid A REXX host variable containing the identifier returned from the OPEN DATABASE DIRECTORY SCAN API.

value A compound REXX host variable to which the database entry information is returned. If no name is given, the name `SQLDINFO` is used. In the following, XXX represents the host variable name (the corresponding field names are taken from the structure returned by the API):

XXX.0	Number of elements in the variable (always 12)
XXX.1	ALIAS (alias of the database)
XXX.2	DBNAME (name of the database)
XXX.3	DRIVE/PATH (local database directory path name)
XXX.3.1	NODE NUMBER (valid for local database directory only)
XXX.4	INTNAME (token identifying the database subdirectory)
XXX.5	NODENAME (name of the node where the database is located)
XXX.6	DBTYPE (product name and release number)
XXX.7	COMMENT (comment associated with the database)
XXX.8	Reserved
XXX.9	TYPE (entry type)
XXX.10	AUTHENTICATION (authentication type)
XXX.10.1	DCE principal
XXX.11	GLBDBNAME (Global database name)
XXX.12	CATALOG NODE NUMBER

Sample Programs

C	\sqllib\samples\c\dbcat.c
COBOL	\sqllib\samples\cobol\dbcat.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

Usage Notes

All fields of the directory entry information buffer are padded to the right with blanks.

A subsequent GET NEXT DATABASE DIRECTORY ENTRY obtains the entry following the current entry.

The *sqlcode* value of *sqlca* is set to 1014 if there are no more entries to scan when GET NEXT DATABASE DIRECTORY ENTRY is called.

The count value returned by the OPEN DATABASE DIRECTORY SCAN API can be used to scan through the entire directory by issuing GET NEXT DATABASE DIRECTORY ENTRY calls, one at a time, until the number of scans equals the count of entries.

See Also

"sqledcls - Close Database Directory Scan" on page 176

"sqledosd - Open Database Directory Scan" on page 181.

sqledosd - Open Database Directory Scan

Stores a copy of the system database directory or the local database directory in memory, and returns the number of entries. This copy represents a snapshot of the directory at the time the directory is opened. This copy is not updated, even if the directory itself is changed later.

Use "sqledgne - Get Next Database Directory Entry" on page 178 to advance through the database directory, examining information about the database entries. Close the scan using "sqledcls - Close Database Directory Scan" on page 176. This removes the copy of the directory from memory.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Open Database Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqledosd (
    _SQLOLDCHAR * pPath,
    unsigned short * pHandle,
    unsigned short * pNumEntries,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Open Database Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdosd (
    unsigned short PathLen,
    struct sqlca * pSqlca,
    unsigned short * pNumEntries,
    unsigned short * pHandle,
    _SQLOLDCHAR * pPath);
/* ... */
```

API Parameters

PathLen
Input. A 2-byte unsigned integer representing the length in bytes of the path parameter. Set to zero if no path is provided.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNumEntries
Output. Address of a 2-byte area where the number of directory entries is returned.

pHandle
Output. Address of a 2-byte area for the returned identifier. This identifier must be passed to "sqledgne - Get Next Database Directory Entry" on page 178 for scanning the database entries, and to "sqledcls - Close Database Directory Scan" on page 176 to release the resources.

pPath Input. The name of the path on which the local database directory resides. If the specified path is a NULL pointer, the system database directory is used.

REXX API Syntax

```
OPEN DATABASE DIRECTORY [ON path_name] USING :value
```

REXX API Parameters

path_name
Name of the path on which the local database directory resides. If the path is not specified, the system database directory is used.

value A compound REXX host variable to which database directory information is returned. In the following, XXX represents the host variable name.

XXX.0	Number of elements in the variable (always 2)
XXX.1	Identifier (handle) for future scan access
XXX.2	Number of entries contained within the directory.

Sample Programs

C	\sqllib\samples\c\dbcat.c
COBOL	\sqllib\samples\cobol\dbcat.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

Usage Notes

Storage allocated by this API is freed by "sqledcls - Close Database Directory Scan" on page 176.

Multiple OPEN DATABASE DIRECTORY SCAN APIs can be issued against the same directory. However, the results may not be the same. The directory may change between openings.

There can be a maximum of eight opened database directory scans per process.

See Also

"sqledcls - Close Database Directory Scan" on page 176

"sqledgne - Get Next Database Directory Entry" on page 178.

sqledpan - Drop Database at Node

Drops a database at a specified node. Can only be run on an MPP server.

Scope

This API only affects the node on which it is called.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None. An instance attachment is established for the duration of the call.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Drop Database at Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqledpan (
    char * pDbAlias,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Drop Database at Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdpan (
    unsigned short Reserved1,
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    void * pReserved2,
    char * pDbAlias);
/* ... */
```

API Parameters

Reserved1
Reserved for future use.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pReserved2
A spare pointer that is set to null or points to zero. Reserved for future use.

pDbAlias
Input. A string containing the alias of the database to be dropped. This name is used to reference the actual database name in the system database directory.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

This API is used by utilities supplied with DB2 Universal Database Enterprise - Extended Edition, and is not intended for general use. Improper use of this API can cause inconsistencies in the system, so it should only be used with caution.

See Also

"sqlecran - Create Database at Node" on page 157

"sqledrpd - Drop Database" on page 188.

sqledreg - Deregister

Deregisters the DB2 server from a network file server. The DB2 server's network address is removed from a specified registry on the file server.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Deregister */
/* ... */
SQL_API_RC SQL_API_FN
  sqledreg (
    unsigned short Registry,
    void * pRegisterInfo,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Deregister */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdreg (
    unsigned short Registry,
    void * pRegisterInfo,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Registry
Input. Indicates where on the network file server to deregister the DB2 server. In this release, the only supported registry is `SQL_NWBINDERY` (NetWare file server bindery, defined in `sqlenv`).

pRegisterInfo
Input. A pointer to the *sqle_reg_nwbindery* structure. In this structure, the caller specifies a user name and password that are valid on the network file server. For more information about this structure, see "SQLE-REG-NWBINDERY" on page 479.

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

When *Registry* has a value of `SQL_NWBINDERY`, this API uses the NetWare user name and password supplied in the *sqle_reg_nwbindery* structure to log onto the NetWare file server (FILESERVER) specified in the database manager configuration file. The object name (OBJECTNAME) specified in the database manager configuration file is deleted from the NetWare file server bindery.

The NetWare user name and password specified must have supervisory or equivalent authority.

This API *must* be issued locally from the DB2 server. It is not supported remotely.

If the IPX/SPX fields are reconfigured, or the DB2 server's IPX/SPX internetwork address changes, deregister the DB2 server from the network file server before making the changes, and then register it again after the changes have been made.

See Also

"sqleregs - Register" on page 241.

sqledrpd - Drop Database

Deletes the database contents and all log files for the database, uncatalogs the database, and deletes the database subdirectory.

Scope

By default, this API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Instance. It is not necessary to call ATTACH before dropping a remote database. If the database is cataloged as remote, an instance attachment to the remote node is established for the duration of the call.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Drop Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqledrpd (
    _SQLOLDCHAR * pDbAlias,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Drop Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdrpd (
    unsigned short Reserved1,
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pReserved2,
    _SQLOLDCHAR * pDbAlias);
/* ... */
```

API Parameters

Reserved1
Reserved for future use.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pReserved2
A spare pointer that is set to null or points to zero. Reserved for future use.

pDbAlias
Input. A string containing the alias of the database to be dropped. This name is used to reference the actual database name in the system database directory.

REXX API Syntax

```
DROP DATABASE dbalias
```

REXX API Parameters

dbalias
The alias of the database to be dropped.

Sample Programs

C	\sqllib\samples\c\dbconf.sqc
COBOL	\sqllib\samples\cobol\dbconf.sqb
REXX	\sqllib\samples\rexx\dbconf.cmd

Usage Notes

sqledrpd deletes all user data and log files. If the log files are needed for a roll-forward recovery after a restore operation, the files should be saved prior to calling this API.

The database must not be in use; all users must be disconnected from the database before the database can be dropped.

To be dropped, a database must be cataloged in the system database directory. Only the specified database alias is removed from the system database directory. If other aliases with the same database name exist, their entries remain. If the database being dropped is the last entry in the local database directory, the local database directory is deleted automatically.

If this API is called from a remote client (or from a different instance on the same machine), the specified alias is removed from the client's system database directory. The corresponding database name is removed from the server's system database directory.

This API unlinks all files that are linked through any DATALINK columns. Since the unlink operation is performed asynchronously on the DB2 Data Links Manager, its effects may not be seen immediately on the DB2 Data Links Manager, and the unlinked files may not be immediately available for other operations. When the API is called, all the DB2 Data Links Managers configured to that database must be available; otherwise, the drop database operation will fail.

See Also

"sqlecadb - Catalog Database" on page 149

"sqlecrea - Create Database" on page 159

"sqlecran - Create Database at Node" on page 157

"sqledpan - Drop Database at Node" on page 184

"sqleuncd - Uncatalog Database" on page 254.

sqledrpn - Drop Node Verify

Verifies whether a node is being used by a database. A message is returned, indicating whether the node can be dropped.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Drop Node Verify */
/* ... */
SQL_API_RC SQL_API_FN
  sqledrpn (
    unsigned short Action,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Drop Node Verify */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdrpn (
    unsigned short Reserved1,
    struct sqlca * pSqlca,
    void * pReserved2,
    unsigned short Action);
/* ... */
```

API Parameters

Reserved1
Reserved for the length of *pReserved2*.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pReserved2
A spare pointer that is set to NULL or points to 0. Reserved for future use.

Action
The action requested. The valid value is:

SQL_DROPNODE_VERIFY

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

If a message is returned, indicating that the node is not in use, use the **db2stop** command with DROP NODENUM to remove the entry for the node from the `db2nodes.cfg` file, which removes the node from the database system.

If a message is returned, indicating that the node is in use, the following actions should be taken:

1. If the node contains data, redistribute the data to remove it from the node using "sqludrdt - Redistribute Nodegroup" on page 298. Use either the drop node option on the **sqludrdt** API, or the ALTER NODEGROUP statement to remove the node from any nodegroups for the database. This must be done for each database that contains the node in a nodegroup. For more information, see the *SQL Reference*.
2. Drop any event monitors that are defined on the node.
3. Rerun **sqledrpn** to ensure that the database is no longer in use.

See Also

"sqleaddn - Add Node" on page 138

"sqlepstp - Stop Database Manager" on page 233.

sqledtin - Detach

Removes the logical instance attachment, and terminates the physical communication connection if there are no other logical connections using this layer.

Authorization

None

Required Connection

None. Removes an existing instance attachment.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Detach */
/* ... */
SQL_API_RC SQL_API_FN
  sqledtin (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Detach */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdtin (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
DETACH
```

Sample Programs

C	\sqllib\samples\c\dbinst.c
COBOL	\sqllib\samples\cobol\dbinst.cbl
REXX	\sqllib\samples\rexx\dbinst.cmd

See Also

"sqleatin - Attach" on page 145.

sqlefmem - Free Memory

Frees memory allocated by DB2 APIs on the caller's behalf. Intended for use with "sqlbtcq - Tablespace Container Query" on page 127 and "sqlbmtsq - Tablespace Query" on page 113.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Free Memory */
/* ... */
SQL_API_RC SQL_API_FN
  sqlefmem (
    struct sqlca * pSqlca,
    void * pBuffer);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Free Memory */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgfmem (
    struct sqlca * pSqlca,
    void * pBuffer);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pBuffer
Input. Pointer to the memory to be freed.

Sample Programs

C	\sqllib\samples\c\tspace.sqc
COBOL	\sqllib\samples\cobol\tspace.sqb

sqlefrce - Force Application

Forces local or remote users or applications off the system to allow for maintenance on a server.

Attention: If an operation that cannot be interrupted (RESTORE DATABASE, for example) is forced, the operation must be successfully re-executed before the database becomes available.

Scope

This API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file.

In a partitioned database environment, this API does not have to be issued from the coordinator node of the application being forced. This API can be issued from any node (database partition server) in the partitioned database environment.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Instance. To force users off a remote server, it is necessary to first attach to that server. If no attachment exists, this API is executed locally.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Force Application */
/* ... */
SQL_API_RC SQL_API_FN
  sqlefrce (
    long NumAgentIds,
    sqluint32 * pAgentIds,
    unsigned short ForceMode,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Force Application */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgfrce (
    struct sqlca * pSqlca,
    unsigned short ForceMode,
    sqluint32 * pAgentIds,
    long NumAgentIds);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

ForceMode
Input. An integer specifying the operating mode of the FORCE APPLICATION API. Only the asynchronous mode is supported. This means that FORCE APPLICATION does not wait until all specified users are terminated before returning. It returns as soon as the API has been issued successfully, or an error occurs. As a result, there may be a short interval between the time the FORCE APPLICATION call completes and the specified users have been terminated.

This parameter must be set to `SQL_ASYNCH` (defined in `sqlenv`).

pAgentIds
Input. Pointer to an array of unsigned long integers. Each entry describes the agent ID of the corresponding database user. To list the agent IDs of the active applications, use "db2GetSnapshot - Get Snapshot" on page 27.

NumAgentIds
Input. An integer representing the total number of users to be terminated. This number should be the same as the number of elements in the array of agent IDs.

If this parameter is set to `SQL_ALL_USERS` (defined in `sqlenv`), all users are forced. If it is set to zero, an error is returned.

REXX API Syntax

```
FORCE APPLICATION {ALL | :agentidarray} [MODE ASYNC]
```

REXX API Parameters

ALL All applications will be disconnected from their database connection.

agentidarray
A compound REXX host variable containing the list of agent IDs to be terminated. In the following, XXX is the name of the host variable:

XXX.0 Number of agents to be terminated

XXX.1 First agent ID

XXX.2 Second agent ID

XXX.3 and so on.

ASYNC
The only mode currently supported means that FORCE APPLICATION does not wait until all specified applications are terminated before returning.

Sample Programs

C	\sqllib\samples\c\dbstop.sqc
COBOL	\sqllib\samples\cobol\dbstop.sqb
REXX	\sqllib\samples\rexx\dbstop.cmd

Usage Notes

db2stop cannot be executed during a force. The database manager remains active so that subsequent database manager operations can be handled without the need for **db2start**.

To preserve database integrity, only users who are idling or executing interruptible database operations can be terminated.

After a FORCE has been issued, the database will still accept requests to connect. Additional forces may be required to completely force all users off.

The database system monitor functions are used to gather the agent IDs of the users to be forced. For more information, see the *System Monitor Guide and Reference*.

When the force mode is set to `SQL_ASYNCH` (the only value permitted), the API immediately returns to the calling application.

Minimal validation is performed on the array of agent IDs to be forced. The user must ensure that the pointer points to an array containing the total number of elements specified. If *NumAgentIds* is set to `SQL_ALL_USERS`, the array is ignored.

When a user is terminated, a ROLLBACK is performed to ensure database consistency.

All users that can be forced will be forced. If one or more specified agent IDs cannot be found, *sqlcode* in the *sqlca* structure is set to 1230. An agent ID may not be found, for instance, if the user signs off between the time an agent ID is collected and **sqlefrce** is called. The user that calls this API is never forced off.

Agent IDs are recycled, and are used to force applications some time after being gathered by the database system monitor. When a user signs off, therefore, another user may sign on and acquire the same agent ID through this recycling process, with the result that the wrong user may be forced.

See Also

"sqleatin - Attach" on page 145

"sqledtin - Detach" on page 193

"sqlepstp - Stop Database Manager" on page 233

"db2GetSnapshot - Get Snapshot" on page 27.

sqlegdad - Catalog DCS Database

Stores information about remote databases in the Database Connection Services (DCS) directory. These databases are accessed through an Application Requester (AR), such as DB2 Connect. Having a DCS directory entry with a database name matching a database name in the system database directory invokes the specified AR to forward SQL requests to the remote server where the database resides. For more information about DB2 Connect and DCS directory entries, see the *DB2 Connect User's Guide*.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Catalog DCS Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdad (
    struct sql_dir_entry * pDCSDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Catalog DCS Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdad (
    struct sqlca * pSqlca,
    struct sql_dir_entry * pDCSDirEntry);
/* ... */
```

API Parameters

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDCSDirEntry
Input. A pointer to an *sql_dir_entry* (Database Connection Services directory) structure. For more information about this structure, see "SQL-DIR-ENTRY" on page 437.

REXX API Syntax

```
CATALOG DCS DATABASE dbname [AS target_dbname]
[AR arname] [PARMS parms] [WITH comment]
```

REXX API Parameters

dbname
The local database name of the directory entry to be added.

target_dbname
The target database name.

arname
The application client name.

parms Parameter string. If specified, the string must be enclosed by double quotation marks.

comment
Description associated with the entry. Maximum length is 30 characters. Enclose the comment by double quotation marks.

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

Usage Notes

The DB2 Connect program provides connections to DRDA Application Servers such as:

- DB2 for OS/390 databases on System/370 and System/390 architecture host computers
- DB2 for VM and VSE databases on System/370 and System/390 architecture host computers
- OS/400 databases on Application System/400 (AS/400) host computers.

The database manager creates a Database Connection Services directory if one does not exist. This directory is stored on the path that contains the database manager instance that is being used. The DCS directory is maintained outside of the database.

The database must also be cataloged as a remote database in the system database directory.

List the contents of the DCS directory using "sqlegdsc - Open DCS Directory Scan" on page 213, "sqlegdge - Get DCS Directory Entry for Database" on page 208, "sqlegdgt - Get DCS Directory Entries" on page 210, and "sqlegdcl - Close DCS Directory Scan" on page 203.

Note: If directory caching is enabled (see the configuration parameter *dir_cache* in "sqlfxsys - Get Database Manager Configuration" on page 278), database, node, and DCS directory files are cached in memory. An application's directory cache is created during its first directory lookup. Since the cache is only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

See Also

"sqlegdel - Uncatalog DCS Database" on page 205.

sqlegdcl - Close DCS Directory Scan

Frees the resources that are allocated by "sqlegdsc - Open DCS Directory Scan" on page 213.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Close DCS Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdcl (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Close DCS Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdcl (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
CLOSE DCS DIRECTORY
```

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

See Also

"sqlegdgt - Get DCS Directory Entries" on page 210

"sqlegdsc - Open DCS Directory Scan" on page 213.

sqlegdel - Uncatalog DCS Database

Deletes an entry from the Database Connection Services (DCS) directory.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog DCS Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdel (
    struct sql_dir_entry * pDCSDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog DCS Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdel (
    struct sqlca * pSqlca,
    struct sql_dir_entry * pDCSDirEntry);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDCSDirEntry
Input/Output. A pointer to the Database Connection Services directory structure. For more information about this structure, see "SQL-DIR-ENTRY" on page 437. Fill in the *ldb* field of this structure with the local name of the database to be deleted. The DCS directory entry with a matching local database name is copied to this structure before being deleted.

sqlegdel - Uncatalog DCS Database

REXX API Syntax

```
UNCATALOG DCS DATABASE dbname [USING :value]
```

REXX API Parameters

dbname
The local database name of the directory entry to be deleted.

value A compound REXX host variable into which the directory entry information is returned. In the following, XXX represents the host variable name. If no name is given, the name SQLGWINF is used.

XXX.0	Number of elements in the variable (always 7)
XXX.1	RELEASE
XXX.2	LDB
XXX.3	TDB
XXX.4	AR
XXX.5	PARMS
XXX.6	COMMENT
XXX.7	RESERVED.

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

Usage Notes

DCS databases are also cataloged in the system database directory as remote databases that can be uncataloged using “sqleuncd - Uncatalog Database” on page 254.

To recatalog a database in the DCS directory, use “sqlegdad - Catalog DCS Database” on page 200.

To list the DCS databases that are cataloged on a node, use “sqlegdsc - Open DCS Directory Scan” on page 213, “sqlegdgt - Get DCS Directory Entries” on page 210, and “sqlegdcl - Close DCS Directory Scan” on page 203.

If directory caching is enabled (see the configuration parameter *dir_cache* in “sqlfxsys - Get Database Manager Configuration” on page 278), database, node, and DCS directory files are cached in memory. An application’s directory cache is created during its first directory lookup. Since the cache is

only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

See Also

"sqlegdad - Catalog DCS Database" on page 200

"sqlegdcl - Close DCS Directory Scan" on page 203

"sqlegdge - Get DCS Directory Entry for Database" on page 208

"sqlegdgt - Get DCS Directory Entries" on page 210

"sqlegdsc - Open DCS Directory Scan" on page 213

"sqleuncd - Uncatalog Database" on page 254.

sqlegdge - Get DCS Directory Entry for Database

Returns information for a specific entry in the Database Connection Services (DCS) directory.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Get DCS Directory Entry for Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdge (
    struct sql_dir_entry * pDCSDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Get DCS Directory Entry for Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdge (
    struct sqlca * pSqlca,
    struct sql_dir_entry * pDCSDirEntry);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDCSDirEntry
Input/Output. Pointer to the Database Connection Services directory structure. For more information about this structure, see "SQL-DIR-ENTRY" on page 437. Fill in the *ldb* field of this structure with the local name of the database whose DCS directory entry is to be retrieved. The remaining fields in the structure are filled in upon return of this API.

REXX API Syntax

```
GET DCS DIRECTORY ENTRY FOR DATABASE dbname [USING :value]
```

REXX API Parameters

dbname
Specifies the local database name of the directory entry to be obtained.

value A compound REXX host variable into which the directory entry information is returned. In the following, XXX represents the host variable name. If no name is given, the name SQLGWINF is used.

XXX.0	Number of elements in the variable (always 7)
XXX.1	RELEASE
XXX.2	LDB
XXX.3	TDB
XXX.4	AR
XXX.5	PARMS
XXX.6	COMMENT
XXX.7	RESERVED.

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

See Also

"sqlegdad - Catalog DCS Database" on page 200

"sqlegdcl - Close DCS Directory Scan" on page 203

"sqlegdel - Uncatalog DCS Database" on page 205

"sqlegdgt - Get DCS Directory Entries" on page 210

"sqlegdsc - Open DCS Directory Scan" on page 213.

sqlegdgt - Get DCS Directory Entries

Transfers a copy of Database Connection Services (DCS) directory entries to a buffer supplied by the application.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Get DCS Directory Entries */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdgt (
    short * pNumEntries,
    struct sql_dir_entry * pDCSDirEntries,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Get DCS Directory Entries */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdgt (
    struct sqlca * pSqlca,
    short * pNumEntries,
    struct sql_dir_entry * pDCSDirEntries);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNumEntries
Input/Output. Pointer to a short integer representing the number of entries to be copied to the caller's buffer. The number of entries actually copied is returned.

pDCSDirEntries
Output. Pointer to a buffer where the collected DCS directory entries will be held upon return of the API call. For more information about

this structure, see "SQL-DIR-ENTRY" on page 437. The buffer must be large enough to hold the number of entries specified in the *pNumEntries* parameter.

REXX API Syntax

```
GET DCS DIRECTORY ENTRY [USING :value]
```

REXX API Parameters

value A compound REXX host variable into which the directory entry information is returned. In the following, XXX represents the host variable name. If no name is given, the name SQLGWINF is used.

XXX.0	Number of elements in the variable (always 7)
XXX.1	RELEASE
XXX.2	LDB
XXX.3	TDB
XXX.4	AR
XXX.5	PARMS
XXX.6	COMMENT
XXX.7	RESERVED.

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

Usage Notes

"sqlegdsc - Open DCS Directory Scan" on page 213, which returns the entry count, must be called prior to issuing GET DCS DIRECTORY ENTRIES.

If all entries are copied to the caller, the Database Connection Services directory scan is automatically closed, and all resources are released.

If entries remain, subsequent calls to this API should be made, or CLOSE DCS DIRECTORY SCAN should be called, to release system resources.

See Also

"sqlegdcl - Close DCS Directory Scan" on page 203

"sqlegdge - Get DCS Directory Entry for Database" on page 208

"sqlegdsc - Open DCS Directory Scan" on page 213.

sqlegdsc - Open DCS Directory Scan

Stores a copy in memory of the Database Connection Services directory entries, and returns the number of entries. This is a snapshot of the directory at the time the directory is opened.

The copy is not updated if the directory itself changes after a call to this API. Use "sqlegdgt - Get DCS Directory Entries" on page 210 to retrieve the entries, and "sqlegdcl - Close DCS Directory Scan" on page 203 to release the resources associated with calling this API.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Open DCS Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegdsc (
    short * pNumEntries,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Open DCS Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggdsc (
    struct sqlca * pSqlca,
    short * pNumEntries);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNumEntries
Output. Address of a 2-byte area to which the number of directory entries is returned.

sqlegdsc - Open DCS Directory Scan

REXX API Syntax

```
OPEN DCS DIRECTORY
```

Sample Programs

C	\sqllib\samples\c\dcscat.c
COBOL	\sqllib\samples\cobol\dcscat.cbl
REXX	\sqllib\samples\rexx\dcscat.cmd

Usage Notes

The caller of the scan uses the returned value *pNumEntries* to allocate enough memory to receive the entries. If a scan call is received while a copy is already held, the previous copy is released, and a new copy is collected.

See Also

"sqlegdcl - Close DCS Directory Scan" on page 203

"sqlegdge - Get DCS Directory Entry for Database" on page 208

"sqlegdgt - Get DCS Directory Entries" on page 210.

sqlegins - Get Instance

Returns the value of the **DB2INSTANCE** environment variable.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Get Instance */
/* ... */
SQL_API_RC SQL_API_FN
  sqlegins (
    _SQLOLDCHAR * pInstance,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Get Instance */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggins (
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pInstance);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pInstance
Output. Pointer to a string buffer where the database manager instance name is placed. This buffer must be at least 8 bytes in length.

REXX API Syntax

```
GET INSTANCE INTO :instance
```

REXX API Parameters

instance
A REXX host variable into which the database manager instance name is to be placed.

Sample Programs

C	\sqllib\samples\c\dbinst.c
COBOL	\sqllib\samples\cobol\dbinst.cbl
REXX	\sqllib\samples\rexx\dbinst.cmd

Usage Notes

The value in the **DB2INSTANCE** environment variable is not necessarily the instance to which the user is attached.

To identify the instance to which a user is currently attached, call "sqleatin - Attach" on page 145, with null arguments except for the *sqlca* structure.

sqleintr - Interrupt

Stops a request. This API is called from a control break signal handler in an application. The control break signal handler can be the default, installed by "sqleisig - Install Signal Handler" on page 219, or a routine supplied by the programmer and installed using an appropriate operating system call.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Interrupt */
/* ... */
SQL_API_RC SQL_API_FN
  sqleintr (
    void);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Interrupt */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgintr (
    void);
/* ... */
```

API Parameters

None

REXX API Syntax

```
INTERRUPT
```

Examples

```
call SQLDBS 'INTERRUPT'
```

Usage Notes

No database manager APIs should be called from an interrupt handler except **sqleintr**. However, the system will not prevent it.

Any database transaction in a state of committing or rollback cannot be interrupted.

An interrupted database manager request returns a code indicating that it was interrupted.

The following table summarizes the effect of an interrupt operation on other APIs:

Table 7. INTERRUPT Actions

Database Activity	Action
BACKUP	Utility cancelled. Data on media may be incomplete.
BIND	Binding cancelled. Package creation rolled back.
COMMIT	None. COMMIT completes.
CREATE DATABASE/CREATE DATABASE AT NODE/ADD NODE/DROP NODE VERIFY	After a certain point, these APIs are not interruptible. If the interrupt call is received before this point, the database is not created. If the interrupt call is received after this point, it is ignored.
DROP DATABASE/DROP DATABASE AT NODE	None. These APIs complete.
EXPORT/IMPORT/RUNSTATS	Utility cancelled. Database updates rolled back.
FORCE APPLICATION	None. FORCE APPLICATION completes.
LOAD	Utility cancelled. Data in table may be incomplete.
PREP	Precompile cancelled. Package creation rolled back.
REORGANIZE TABLE	Utility cancelled. Table is left in its previous state.
RESTORE	Utility cancelled. DROP DATABASE performed. Not applicable to table space level restore.
ROLLBACK	None. ROLLBACK completes.
Directory Services	Directory left in consistent state. Utility function may or may not be performed.
SQL Data Definition statements	Database transactions are set to the state existing prior to invocation of the SQL statement.
Other SQL statements	Database transactions are set to the state existing prior to invocation of the SQL statement.

See Also

"sqleisig - Install Signal Handler" on page 219.

sqleisig - Install Signal Handler

Installs the default interrupt (usually Control-C and/or Control-Break) signal handler. When this default handler detects an interrupt signal, it resets the signal and calls "sqleintr - Interrupt" on page 217.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Install Signal Handler */
/* ... */
SQL_API_RC SQL_API_FN
  sqleisig (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Install Signal Handler */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgisig (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
INSTALL SIGNAL HANDLER
```

Sample Programs

C	\sqllib\samples\c\dbcmt.c
COBOL	\sqllib\samples\cobol\ish.cbl
REXX	\sqllib\samples\rexx\dbcmt.cmd

Usage Notes

If an application has no signal handler, and an interrupt is received, the application is terminated. This API provides simple signal handling, and can be used if an application does not have extensive interrupt handling requirements.

The API must be called for the interrupt signal handler to function properly.

If an application requires a more elaborate interrupt handling scheme, a signal handling routine that can also call "sqleintr - Interrupt" on page 217 can be developed. Use either the operating system call or the language-specific library signal function. "sqleintr - Interrupt" on page 217 should be the only database manager operation performed by a customized signal handler. Follow all operating system programming techniques and practices to ensure that the previously installed signal handlers work properly.

See Also

"sqleintr - Interrupt" on page 217.

sqlemgdb - Migrate Database

Converts previous (Version 2.x or higher) versions of DB2 databases to current formats.

Authorization

sysadm

Required Connection

This API establishes a database connection.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Migrate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlemgdb (
    _SQLOLDCHAR * pDbAlias,
    _SQLOLDCHAR * pUserName,
    _SQLOLDCHAR * pPassword,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Migrate Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgmgdb (
    unsigned short PasswordLen,
    unsigned short UserNameLen,
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pPassword,
    _SQLOLDCHAR * pUserName,
    _SQLOLDCHAR * pDbAlias);
/* ... */
```

API Parameters

PasswordLen
Input. A 2-byte unsigned integer representing the length in bytes of the password. Set to zero when no password is supplied.

UserNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the user name. Set to zero when no user name is supplied.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pPassword
Input. A string containing the password of the supplied user name (if any). May be NULL.

pUserName
Input. A string containing the user name of the application. May be NULL.

pDbAlias
Input. A string containing the alias of the database that is cataloged in the system database directory.

REXX API Syntax

```
MIGRATE DATABASE dbalias [USER username USING password]
```

REXX API Parameters

dbalias
Alias of the database to be migrated.

username
User name under which the database is to be restarted.

password
Password used to authenticate the user name.

Sample Programs

C	\sqllib\samples\c\migrate.c
COBOL	\sqllib\samples\cobol\migrate.cbl
REXX	\sqllib\samples\rexx\migrate.cmd

Usage Notes

This API will only migrate a database to a newer version, and cannot be used to convert a migrated database to its previous version.

The database must be cataloged before migration.

For detailed information about database migration, see one of the *Quick Beginnings* books.

sqlencls - Close Node Directory Scan

Frees the resources that are allocated by "sqlenops - Open Node Directory Scan" on page 228.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Close Node Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlencls (
    unsigned short Handle,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Close Node Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgncls (
    unsigned short Handle,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Handle
Input. Identifier returned from the associated OPEN NODE DIRECTORY SCAN API.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
CLOSE NODE DIRECTORY :scanid
```

REXX API Parameters

scanid A host variable containing the *scanid* returned from the OPEN NODE DIRECTORY SCAN API.

Sample Programs

C	\sqllib\samples\c\nodecat.sqc
COBOL	\sqllib\samples\cobol\nodecat.sqb
REXX	\sqllib\samples\rexx\nodecat.cmd

See Also

"sqlengne - Get Next Node Directory Entry" on page 225

"sqlenops - Open Node Directory Scan" on page 228.

sqlengne - Get Next Node Directory Entry

Returns the next entry in the node directory after "sqlenops - Open Node Directory Scan" on page 228 is called. Subsequent calls to this API return additional entries.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Get Next Node Directory Entry */
/* ... */
SQL_API_RC SQL_API_FN
  sqlengne (
    unsigned short Handle,
    struct sqleninfo ** ppNodeDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Get Next Node Directory Entry */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgngne (
    unsigned short Handle,
    struct sqleninfo ** ppNodeDirEntry,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Handle
Input. Identifier returned from "sqlenops - Open Node Directory Scan" on page 228.

ppNodeDirEntry
Output. Address of a pointer to an *sqleninfo* structure. The caller of this API does not have to provide memory for the structure, just the pointer. Upon return from the API, the pointer points to the next node directory entry in the copy of the node directory allocated by

"sqlenops - Open Node Directory Scan" on page 228. For more information about the *sqleninfo* structure, see "SQLENINFO" on page 496.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
GET NODE DIRECTORY ENTRY :scanid [USING :value]
```

REXX API Parameters

scanid A REXX host variable containing the identifier returned from the OPEN NODE DIRECTORY SCAN API.

value A compound REXX host variable to which the node entry information is returned. If no name is given, the name `SQLNINFO` is used. In the following, XXX represents the host variable name (the corresponding field names are taken from the structure returned by the API):

XXX.0	Number of elements in the variable (always 16)
XXX.1	NODENAME
XXX.2	LOCALLU
XXX.3	PARTNERLU
XXX.4	MODE
XXX.5	COMMENT
XXX.6	RESERVED
XXX.7	PROTOCOL (protocol type)
XXX.8	ADAPTER (NetBIOS adapter #)
XXX.9	RESERVED
XXX.10	SYMDESTNAME (symbolic destination name)
XXX.11	SECURITY (security type)
XXX.12	HOSTNAME
XXX.13	SERVICENAME
XXX.14	FILESERVER
XXX.15	OBJECTNAME
XXX.16	INSTANCE (local instance name).

Sample Programs

C	\sqllib\samples\c\nodecat.c
COBOL	\sqllib\samples\cobol\nodecat.cbl
REXX	\sqllib\samples\rexx\nodecat.cmd

Usage Notes

All fields in the node directory entry information buffer are padded to the right with blanks.

The *sqlcode* value of *sqlca* is set to 1014 if there are no more entries to scan when this API is called.

The entire directory can be scanned by calling this API *pNumEntries* times (*pNumEntries* is returned by "sqlenops - Open Node Directory Scan" on page 228).

See Also

"sqlencls - Close Node Directory Scan" on page 223

"sqlenops - Open Node Directory Scan" on page 228.

sqlenops - Open Node Directory Scan

Stores a copy in memory of the node directory, and returns the number of entries. This is a snapshot of the directory at the time the directory is opened. This copy is not updated, even if the directory itself is changed later.

Use "sqlengne - Get Next Node Directory Entry" on page 225 to advance through the node directory and examine information about the node entries. Close the scan using "sqlencls - Close Node Directory Scan" on page 223. This removes the copy of the directory from memory.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Open Node Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlenops (
    unsigned short * pHandle,
    unsigned short * pNumEntries,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Open Node Directory Scan */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgnops (
    unsigned short * pHandle,
    unsigned short * pNumEntries,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pHandle

Output. Identifier returned from this API. This identifier must be passed to "sqlengne - Get Next Node Directory Entry" on page 225, and "sqlencls - Close Node Directory Scan" on page 223.

pNumEntries
Output. Address of a 2-byte area to which the number of directory entries is returned.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
OPEN NODE DIRECTORY USING :value
```

REXX API Parameters

value A compound REXX variable to which node directory information is returned. In the following, XXX represents the host variable name.

XXX.0 Number of elements in the variable (always 2)

XXX.1 Specifies a REXX host variable containing a number for *scanid*

XXX.2 The number of entries contained within the directory.

Sample Programs

C	\sqllib\samples\c\nodecat.c
COBOL	\sqllib\samples\cobol\nodecat.cbl
REXX	\sqllib\samples\rexx\nodecat.cmd

Usage Notes

Storage allocated by this API is freed by calling "sqlencls - Close Node Directory Scan" on page 223.

Multiple node directory scans can be issued against the node directory. However, the results may not be the same. The directory may change between openings.

There can be a maximum of eight node directory scans per process.

See Also

"sqlencls - Close Node Directory Scan" on page 223

"sqlengne - Get Next Node Directory Entry" on page 225.

sqlepstart - Start Database Manager

Starts the current database manager instance background processes on a single node or on all the nodes defined in a multi-node environment.

This API is not valid on a client.

Scope

In a multi-node environment, this API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file, unless the *nodenum* parameter is used (see "SQLE-START-OPTIONS" on page 480).

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Note: On OS/2, no authorization is required if the *ss_logon* database manager configuration parameter is set to `0`.

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Start Database Manager */
/* ... */
SQL_API_RC SQL_API_FN
  sqlepstart (
    struct sqle_start_options * pStartOptions,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Start Database Manager */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgpstart (
    struct sqle_start_options * pStartOptions,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pStartOptions
A pointer to the *sqle_start_options* structure. This structure contains the start-up options. The pointer can be null. For more information about this structure, see "SQLE-START-OPTIONS" on page 480.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\dbstart.c
COBOL	\sqllib\samples\cobol\dbstart.cbl
REXX	\sqllib\samples\rexx\dbstart.cmd

Usage Notes

It is not necessary to call this API on a client node. It is provided for compatibility with older clients, but it has no effect on the database manager.

Once started, the database manager instance runs until the user stops it, even if all application programs that were using it have ended.

If no parameters are specified in a multi-node database environment, the database manager is started on all parallel nodes specified in the node configuration file.

If the API call is still processing, ensure that the applicable nodes have started *before* issuing a request to the database.

The `db2cshrc` file is not supported and cannot be used to define the environment.

On UNIX platforms, **sqlepstart** supports the SIGINT and SIGALRM signals. The SIGINT signal is issued if CTRL+C is pressed. The SIGALRM signal is issued if the value specified for the *start_stop_time* database manager configuration parameter is reached. If either signal occurs, all in-progress startups are interrupted and a message (SQL1044N for SIGINT and SQL6037N for SIGALRM) is returned from each interrupted node to the `$HOME/sqllib/log/db2start.` *timestamp*`.log` error log file. Nodes that are

already started are not affected. If CTRL+C is pressed on a node that is starting, **db2stop** must be issued on that node before an attempt is made to start it again.

See Also

"sqleaddn - Add Node" on page 138

"sqlepstp - Stop Database Manager" on page 233.

sqlepstp - Stop Database Manager

Stops the current database manager instance. Unless explicitly stopped, the database manager continues to be active. This API does not stop the database manager instance if any applications are connected to databases. If there are no database connections, but there are instance attachments, it forces the instance attachments and stops the database manager. This API also deactivates any outstanding database activations before stopping the database manager.

This API can also be used to drop a node from the `db2nodes.cfg` file (MPP systems only).

This API is not valid on a client.

Scope

In a multi-node environment, this API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file, unless the *nodenum* parameter is used (see "SQLEDBSTOPOPT" on page 491).

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Note: On OS/2, no authorization is required if the *ss_logon* database manager configuration parameter is set to `0`.

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Stop Database Manager */
/* ... */
SQL_API_RC SQL_API_FN
  sqlepstp (
    struct sqledbstopopt * pStopOptions,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Stop Database Manager */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgpstp (
    struct sqledbstopopt * pStopOptions,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pStopOptions
A pointer to the *sqledbstopopt* structure. This structure contains the stop options. The pointer can be null. For more information about this structure, see "SQLEDBSTOPOPT" on page 491.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\dbstop.c
COBOL	\sqllib\samples\cobol\dbstop.cbl
REXX	\sqllib\samples\rexx\dbstop.cmd

Usage Notes

It is not necessary to call this API on a client node. It is provided for compatibility with older clients, but it has no effect on the database manager.

Once started, the database manager instance runs until the user stops it, even if all application programs that were using it have ended.

If the database manager cannot be stopped because application programs are still connected to databases, use "sqlefrce - Force Application" on page 196 to disconnect all users first, or call the **sqlepstp** API again with the FORCE option.

The following information currently applies to multiple node environments only:

- If no parameters are specified, the database manager is stopped on each node listed in the node configuration file. The `db2diag.log` file may contain messages to indicate that other nodes are shutting down.
- Any nodes added to the MPP system since the previous call to **sqlepstp** will be updated in the `db2nodes.cfg` file.
- On UNIX platforms, this API supports the SIGALRM signal, which is issued if the value specified for the *start_stop_time* database manager configuration parameter is reached. If this signal occurs, all in-progress stops are interrupted, and message SQL6037N is returned from each interrupted node to the `$HOME/sqllib/log/db2stop.` *timestamp*`.log` error log file. Nodes that are already stopped are not affected.
- The `db2cshrc` file is not supported and cannot be specified as the value for the PROFILE parameter.

See Also

"sqle_deactivate_db - Deactivate Database" on page 135

"sqledrpn - Drop Node Verify" on page 191

"sqlefrce - Force Application" on page 196

"sqlepstart - Start Database Manager" on page 230.

sqleqryc - Query Client

Returns current connection settings for an application process. For information about the applicable connection settings and their values, see "SQLE-CONN-SETTING" on page 465.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Query Client */
/* ... */
SQL_API_RC SQL_API_FN
  sqleqryc (
    struct sqle_conn_setting * pConnectionSettings,
    unsigned short NumSettings,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Query Client */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgqryc (
    struct sqle_conn_setting * pConnectionSettings,
    unsigned short NumSettings,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pConnectionSettings

Input/Output. A pointer to an *sqle_conn_setting* structure, which specifies connection setting types and values. The user defines an array of *NumSettings* connection settings structures, and sets the *type* field of each element in this array to indicate one of the five possible connection settings options. Upon return, the *value* field of each element contains the current setting of the option specified. For more information about this structure, see "SQLE-CONN-SETTING" on page 465.

NumSettings
Input. Any integer (from 0 to 7) representing the number of connection option values to be returned.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
QUERY CLIENT INTO :output
```

REXX API Parameters

output
A compound REXX host variable containing information about the current connection settings of the application process. In the following, XXX represents the host variable name.

XXX.1	Current connection setting for the CONNECTION type
XXX.2	Current connection setting for the SQLRULES
XXX.3	Current connection setting indicating which connections will be released when a COMMIT is issued.
XXX.4	Current connection setting of the SYNCPOINT option. Indicates whether a transaction manager should be used to enforce two-phase commit semantics, whether the database manager should ensure that there is only one database being updated when multiple databases are accessed within a single transaction, or whether neither of these options is to be used.
XXX.5	Current connection setting for the maximum number of concurrent connections for a NETBIOS adapter.
XXX.6	Current connection setting for deferred PREPARE.

Sample Programs

C	\sqllib\samples\c\client.c
COBOL	\sqllib\samples\cobol\client.cbl
REXX	\sqllib\samples\rexx\client.cmd

Usage Notes

The connection settings for an application process can be queried at any time during execution.

If QUERY CLIENT is successful, the fields in the *sqle_conn_setting* structure will contain the current connection settings of the application process. If SET CLIENT has never been called, the settings will contain the values of the precompile options only if an SQL statement has already been processed; otherwise, they will contain the default values for the precompile options.

For information about distributed unit of work (DUOW), see the *Administration Guide*.

See Also

"sqleqryi - Query Client Information" on page 239

"sqlesetc - Set Client" on page 248.

sqleqryi - Query Client Information

Returns existing client information. Since this API permits specification of a database alias, an application can query client information associated with a specific connection. Returns null if "sqleseti - Set Client Information" on page 251 has not previously established a value.

If a specific connection is requested, this API returns the latest values for that connection. If all connections are specified, the API returns the values that are to be associated with all connections; that is, the values passed in the last call to **sqleseti** (specifying all connections).

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Query Client Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqleqryi (
    unsigned short DbAliasLen,
    char * pDbAlias,
    unsigned short NumItems,
    struct sqle_client_info* pClient_Info,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Query Client Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqleqryi (
    unsigned short DbAliasLen,
    char * pDbAlias,
    unsigned short NumItems,
    struct sqle_client_info* pClient_Info,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias. If a value greater than zero is provided, *pDbAlias* must point to the alias name. Returns the settings associated with the last call to **sqleseti** for this alias (or a call to **sqleseti** specifying a zero length alias). If zero is specified, returns the settings associated with the last call to **sqleseti** which specified a zero length alias.

pDbAlias
Input. A pointer to a string containing the database alias.

NumItems
Input. Number of entries being modified. The minimum value is 1.

pClient_Info
Input. A pointer to an array of *NumItems sqle_client_info* structures, each containing a type field indicating which value to return, and a pointer to the returned value. The area pointed to must be large enough to accommodate the value being requested. For more information about this structure, see "SQLE-CLIENT-INFO" on page 462.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C \sqllib\samples\c\cli_info.c

Usage Notes

The settings can be queried at any time during execution. If the API call is successful, the current settings are returned to the specified areas. Returns a length of zero and a null-terminated string (`\0`) for any fields that have not been set through a call to "sqleseti - Set Client Information" on page 251.

See Also

"sqleseti - Set Client Information" on page 251.

sqleregs - Register

Registers the DB2 server on the network server. The DB2 server's network address is stored in a specified registry on the file server, where it can be retrieved by a client application that uses the IPX/SPX communication protocol.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Register */
/* ... */
SQL_API_RC SQL_API_FN
  sqleregs (
    unsigned short Registry,
    void * pRegisterInfo,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Register */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgregs (
    unsigned short Registry,
    void * pRegisterInfo,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

Registry
Input. Indicates where on the network file server to register the DB2 server. In this release, the only supported value is `SQL_NWBINDERY` (NetWare file server bindery, defined in `sqlenv`).

pRegisterInfo
Input. A pointer to the *sqle_reg_nwbindery* structure. In the structure, the caller specifies a user name and password that are valid on the

network file server. For more information about this structure, see "SQLE-REG-NWBINDERY" on page 479.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\regder.c
COBOL	\sqllib\samples\cobol\regder.cbl

Usage Notes

This API determines the IPX/SPX address of the DB2 server machine (the machine from which it was called), and then creates an object in the NetWare file server bindery using the value for *objectname* specified in the database manager configuration file. The IPX/SPX address of the DB2 server is stored as a property in that object. In order for a client to connect or attach to a DB2 database using IPX/SPX file server addressing, it must catalog an IPX/SPX node (using the same FILESERVER and OBJECTNAME specified on the server) in the node directory.

The specified NetWare user name and password must have supervisory or equivalent authority.

This API *must* be issued locally from a DB2 server. It is not supported remotely.

After installation and configuration of DB2, the DB2 server should be registered once on the network file server (unless only *direct addressing* will be used by IPX/SPX clients to connect to this DB2 server). After that, if the IPX/SPX fields are reconfigured, or the DB2 server's IPX/SPX internetwork address changes, deregister the DB2 server on the network file server before making the changes, and then register it again after the changes have been made.

See Also

"sqledreg - Deregister" on page 186.

sqlesact - Set Accounting String

Provides accounting information that will be sent to a DRDA server with the application's next connect request.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Set Accounting String */
/* ... */
SQL_API_RC SQL_API_FN
  sqlesact (
    char * pAccountingString,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Set Accounting String */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgsact (
    unsigned short AccountingStringLen,
    char * pAccountingString,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

AccountingStringLen
Input. A 2-byte unsigned integer representing the length in bytes of the accounting string.

pAccountingString
Input. A string containing the accounting data.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C	\sqllib\samples\c\setact.c
COBOL	\sqllib\samples\cobol\setact.cbl

Usage Notes

To send accounting data with a connect request, an application should call this API before connecting to a database. The accounting string can be changed before connecting to another database by calling the API again; otherwise, the value remains in effect until the end of the application. The accounting string can be at most `SQL_ACCOUNT_STR_SZ` (defined in `sqlenv`) bytes long; longer strings will be truncated. To ensure that the accounting string is converted correctly when transmitted to the DRDA server, use only the characters A to Z, 0 to 9, and the underscore (_).

See Also

The *DB2 Connect User's Guide*, which contains more information about the accounting string and the DRDA servers that support it.

"sqleseti - Set Client Information" on page 251.

sqlesdeg - Set Runtime Degree

Sets the maximum run time degree of intra-partition parallelism for SQL statements for specified active applications. It has no effect on CREATE INDEX parallelism.

Scope

This API affects all nodes that are listed in the `$HOME/sqllib/db2nodes.cfg` file.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

Instance. To change the maximum run time degree of parallelism on a remote server, it is first necessary to attach to that server. If no attachment exists, the SET RUNTIME DEGREE statement fails.

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Set Runtime Degree */
/* ... */
SQL_API_RC SQL_API_FN
  sqlesdeg (
    sqlint32 NumAgentIds,
    sqluint32 * pAgentIds,
    sqlint32 Degree,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Set Runtime Degree */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgsdeg (
    struct sqlca * pSqlca,
    sqlint32 Degree,
    sqluint32 * pAgentIds,
    sqlint32 NumAgentIds);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Degree
Input. The new value for the maximum run time degree of parallelism. The value must be in the range 1 to 32767.

pAgentIds
Input. Pointer to an array of unsigned long integers. Each entry describes the agent ID of the corresponding application. To list the agent IDs of the active applications, use "db2GetSnapshot - Get Snapshot" on page 27.

NumAgentIds
Input. An integer representing the total number of active applications to which the new degree value will apply. This number should be the same as the number of elements in the array of agent IDs.

If this parameter is set to `SQL_ALL_USERS` (defined in `sqlenv`), the new degree will apply to all active applications. If it is set to zero, an error is returned.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C \sqllib\samples\c\setrundg.c

Usage Notes

The database system monitor functions are used to gather the agent IDs and degrees of active applications. For more information, see the *System Monitor Guide and Reference*.

Minimal validation is performed on the array of agent IDs. The user must ensure that the pointer points to an array containing the total number of elements specified. If *NumAgentIds* is set to `SQL_ALL_USERS`, the array is ignored.

If one or more specified agent IDs cannot be found, the unknown agent IDs are ignored, and the function continues. No error is returned. An agent ID may not be found, for instance, if the user signs off between the time an agent ID is collected and the API is called.

Agent IDs are recycled, and are used to change the degree of parallelism for applications some time after being gathered by the database system monitor. When a user signs off, therefore, another user may sign on and acquire the same agent ID through this recycling process, with the result that the new degree of parallelism will be modified for the wrong user.

See Also

"db2GetSnapshot - Get Snapshot" on page 27.

sqlesetc - Set Client

Specifies connection settings for the application. For information about the applicable connection settings and their values, see "SQLE-CONN-SETTING" on page 465.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Set Client */
/* ... */
SQL_API_RC SQL_API_FN
  sqlesetc (
    struct sqle_conn_setting * pConnectionSettings,
    unsigned short NumSettings,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Set Client */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgsetc (
    struct sqle_conn_setting * pConnectionSettings,
    unsigned short NumSettings,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pConnectionSettings

Input. A pointer to the *sqle_conn_setting* structure, which specifies connection setting types and values. Allocate an array of *NumSettings* *sqle_conn_setting* structures. Set the *type* field of each element in this array to indicate the connection option to set. Set the *value* field to the desired value for the option. For more information about this structure, see "SQLE-CONN-SETTING" on page 465.

NumSettings
Input. Any integer (from 0 to 7) representing the number of connection option values to set.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
SET CLIENT USING :values
```

REXX API Parameters

values A compound REXX host variable containing the connection settings for the application process. In the following, XXX represents the host variable name.

XXX.0 Number of connection settings to be established

XXX.1 Specifies how to set up the CONNECTION type. The valid values are:

1 Type 1 CONNECT

2 Type 2 CONNECT

XXX.2 Specifies how to set up the SQLRULES. The valid values are:

DB2 Process type 2 CONNECT according to the DB2 rules

STD Process type 2 CONNECT according to the Standard rules

XXX.3 Specifies how to set up the scope of disconnection to databases at commit. The valid values are:

EXPLICIT Disconnect only those marked by the SQL RELEASE statement

CONDITIONAL
Disconnect only those that have no open WITH HOLD cursors

AUTOMATIC Disconnect all connections

XXX.4 Specifies how to set up the coordination among multiple database connections during commits or rollbacks. The valid values are:

TWOPHASE Use Transaction Manager (TM) to coordinate two-phase commits

ONEPHASE Use one-phase commit

NONE Do not enforce single updater and multiple reader

XXX.5 Specifies the maximum number of concurrent connections for a NETBIOS adapter.

XXX.6 Specifies when to execute the PREPARE statement. The valid values are:

NO The PREPARE statement will be executed at the time it is issued

YES The PREPARE statement will not be executed until the corresponding OPEN, DESCRIBE, or EXECUTE statement is issued. However, the PREPARE INTO statement is not deferred

ALL Same as YES, except that the PREPARE INTO statement is also deferred

Sample Programs

C	\sqllib\samples\c\client.c
COBOL	\sqllib\samples\cobol\client.cbl
REXX	\sqllib\samples\rexx\client.cmd

Usage Notes

If this API is successful, the connections in the subsequent units of work will use the connection settings specified. If this API is unsuccessful, the connection settings are unchanged.

The connection settings for the application can only be changed when there are no existing connections (for example, before any connection is established, or after RELEASE ALL and COMMIT).

Once the SET CLIENT API has executed successfully, the connection settings are fixed and can only be changed by again executing the SET CLIENT API. All corresponding precompiled options of the application modules will be overridden.

For information about distributed unit of work (DUOW), see the *Administration Guide*.

See Also

"sqleqryc - Query Client" on page 236

"sqleseti - Set Client Information" on page 251.

sqleseti - Set Client Information

Permits an application to set client information associated with a specific connection, provided a connection already exists.

In a TP monitor or 3-tier client/server application environment, there is a need to obtain information about the client, and not just the application server that is working on behalf of the client. By using this API, the application server can pass the client's user ID, workstation information, program information, and other accounting information to the DB2 server; otherwise, only the application server's information is passed, and that information is likely to be the same for the many client invocations that go through the same application server.

The application can elect to not specify an alias, in which case the client information will be set for all existing, as well as future, connections. This API will only permit information to be changed outside of a unit of work, either before any SQL is executed, or after a commit or a rollback. If the call is successful, the values for the connection will be sent at the next opportunity, grouped with the next SQL request sent on that connection; a successful call means that the values have been accepted, and that they will be propagated to subsequent connections.

This API can be used to establish values prior to connecting to a database, or it can be used to set or modify the values once a connection has been established.

Authorization

None

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Set Client Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqleseti (
    unsigned short DbAliasLen,
    char * pDbAlias,
    unsigned short NumItems,
    struct sqle_client_info* pClient_Info,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Set Client Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqleseti (
    unsigned short DbAliasLen,
    char * pDbAlias,
    unsigned short NumItems,
    struct sqle_client_info* pClient_Info,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias. If a value greater than zero is provided, *pDbAlias* must point to the alias name, and the settings will affect only the specified connection. If zero is specified, the settings will affect all existing and future connections.

pDbAlias
Input. A pointer to a string containing the database alias.

NumItems
Input. Number of entries being modified. The minimum value is 1.

pClient_Info
Input. A pointer to an array of *NumItems sqle_client_info* structures, each containing a type field indicating which value to set, the length of that value, and a pointer to the new value. For more information about this structure, see "SQLE-CLIENT-INFO" on page 462.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C \sqllib\samples\c\cli_info.c

Usage Notes

If an alias name was provided, a connection to the alias must already exist, and all connections to that alias will inherit the changes. The information will be retained until the connection for that alias is broken. If an alias name was not provided, settings for all existing connections will be changed, and any future connections will inherit the changes. The information will be retained until the program terminates.

The field names represent guidelines for the type of information that can be provided. For example, a TP monitor application could choose to provide the TP monitor transaction ID along with the application name in the SQL_CLIENT_INFO_APPLNAM field. This would provide better monitoring and accounting on the DB2 server, where the DB2 transaction ID can be associated with the TP monitor transaction ID.

Currently this API will only pass information to DB2 OS/390 Version 5 and higher. All information (except the accounting string) is displayed on the DISPLAY THREAD command, and they will all be logged into the accounting records.

See Also

"sqleqryi - Query Client Information" on page 239

"sqlesact - Set Accounting String" on page 243

"sqlesetc - Set Client" on page 248.

sqleuncd - Uncatalog Database

Deletes an entry from the system database directory.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqleuncd (
    _SQLOLDCHAR * pDbAlias,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlguncd (
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pDbAlias);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDbAlias
Input. A string containing the database alias that is to be uncataloged.

REXX API Syntax

```
UNCATALOG DATABASE dbname
```

REXX API Parameters

dbname
Alias of the database to be uncataloged.

Sample Programs

C	\sqllib\samples\c\dbcat.c
COBOL	\sqllib\samples\cobol\dbcat.cbl
REXX	\sqllib\samples\rexx\dbcat.cmd

Usage Notes

Only entries in the system database directory can be uncataloged. Entries in the local database directory can be deleted using "sqledrpd - Drop Database" on page 188.

To recatalog the database, use "sqlecadb - Catalog Database" on page 149.

To list the databases that are cataloged on a node, use "sqledosd - Open Database Directory Scan" on page 181, "sqledgne - Get Next Database Directory Entry" on page 178, and "sqledcls - Close Database Directory Scan" on page 176.

The authentication type of a database, used when communicating with a down-level server, can be changed by first uncataloging the database, and then cataloging it again with a different type.

If directory caching is enabled (see the configuration parameter *dir_cache* in "sqlfxsys - Get Database Manager Configuration" on page 278), database, node, and DCS directory files are cached in memory. An application's directory cache is created during its first directory lookup. Since the cache is only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

See Also

"sqlecadb - Catalog Database" on page 149

"sqledcls - Close Database Directory Scan" on page 176

"sqledgne - Get Next Database Directory Entry" on page 178

"sqledosd - Open Database Directory Scan" on page 181.

sqleuncn - Uncatalog Node

Deletes an entry from the node directory.

Authorization

One of the following:

- *sysadm*
- *sysctrl*

Required Connection

None

API Include File

sqlenv.h

C API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqleuncn (
    _SQLOLDCHAR * pNodeName,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlenv.h */
/* API: Uncatalog Node */
/* ... */
SQL_API_RC SQL_API_FN
  sqlguncn (
    unsigned short NodeNameLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pNodeName);
/* ... */
```

API Parameters

NodeNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the node name.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pNodeName
Input. A string containing the name of the node to be uncataloged.

sqleuncn - Uncatalog Node

REXX API Syntax

```
UNCATALOG NODE nodename
```

REXX API Parameters

nodename
Name of the node to be uncataloged.

Sample Programs

C	\sqllib\samples\c\nodecat.c
COBOL	\sqllib\samples\cobol\nodecat.cbl
REXX	\sqllib\samples\rexx\nodecat.cmd

Usage Notes

To recatalog the node, use "sqlectnd - Catalog Node" on page 168.

To list the nodes that are cataloged, use "sqlenops - Open Node Directory Scan" on page 228, "sqlengne - Get Next Node Directory Entry" on page 225, and "sqlencls - Close Node Directory Scan" on page 223.

If directory caching is enabled (see the configuration parameter *dir_cache* in "sqlfxsys - Get Database Manager Configuration" on page 278), database, node, and DCS directory files are cached in memory. An application's directory cache is created during its first directory lookup. Since the cache is only refreshed when the application modifies any of the directory files, directory changes made by other applications may not be effective until the application has restarted. To refresh DB2's shared cache (server only), stop (**db2stop**) and then restart (**db2start**) the database manager. To refresh the directory cache for another application, stop and then restart that application.

See Also

"sqlectnd - Catalog Node" on page 168

"sqlencls - Close Node Directory Scan" on page 223

"sqlengne - Get Next Node Directory Entry" on page 225

"sqlenops - Open Node Directory Scan" on page 228.

sqlfddb - Get Database Configuration Defaults

Returns the default values of individual entries in a database configuration file.

Authorization

None

Required Connection

Instance. It is not necessary to call ATTACH before getting the configuration of a remote database. If the database is cataloged as remote, an instance attachment to the remote node is established for the duration of the call.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Configuration Defaults */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfddb (
    char * pDbAlias,
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Configuration Defaults */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgddb (
    unsigned short DbAliasLen,
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca,
    char * pDbAlias);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

NumItems
Input. Number of entries to be returned. The minimum valid value is 1.

pItemList
Input/Output. Pointer to an array of *NumItems sqlfupd* structures, each containing a token field indicating which value to return, and a pointer field indicating where to place the configuration value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDbAlias
Input. A string containing the database alias.

Sample Programs

C	\sqllib\samples\c\d_dbconf.c
COBOL	\sqllib\samples\cobol\d_dbconf.cbl

Usage Notes

The application is responsible for allocating sufficient memory for each data element returned. For example, the value returned for *newlogpath* can be up to 242 bytes in length.

DB2 returns the current value of non-updatable parameters.

If an error occurs, the information returned is not valid. If the configuration file is invalid, an error message is returned. The database must be restored from a backup version.

To set the database configuration parameters to the recommended database manager defaults, use "sqlfrdb - Reset Database Configuration" on page 263.

For a brief description of the database configuration parameters, see the *Command Reference*. For more information about tuning these parameters, see the *Administration Guide*.

See Also

"sqlfrdb - Reset Database Configuration" on page 263

"sqlfudb - Update Database Configuration" on page 268

"sqlfxdb - Get Database Configuration" on page 275.

sqlfdsys - Get Database Manager Configuration Defaults

Returns the default values of individual entries in the database manager configuration file.

Authorization

None

Required Connection

None or instance. An instance attachment is not required to perform database manager configuration operations at the current instance (as defined by the value of the **DB2INSTANCE** environment variable), but is required to perform database manager configuration operations at other instances. To display the database manager configuration for another instance, it is necessary to first attach to that instance.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Manager Configuration Defaults */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfdsys (
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Manager Configuration Defaults */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdsys (
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

NumItems
Input. Number of entries being returned. The minimum valid value is 1.

pItemList
Input/Output. Pointer to an array of *NumItems sqlfupd* structures, each

containing a token field indicating which value to return, and a pointer field indicating where to place the configuration value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C	\sqllib\samples\c\d_dbmcon.c
COBOL	\sqllib\samples\cobol\d_dbmcon.cbl

Usage Notes

If an attachment to a remote instance (or a different local instance) exists, the default database manager configuration parameters for the attached server are returned; otherwise, the local default database manager configuration parameters are returned.

If an error occurs, the information returned is not valid. If the configuration file is invalid, an error message is returned. The user must again install the database manager to recover.

The current value of non-updatable parameters is returned as the default.

To set the database manager configuration parameters to the recommended database manager defaults, use "sqlfrsys - Reset Database Manager Configuration" on page 266.

For a brief description of the database manager configuration parameters, see the *Command Reference*. For more information about tuning these parameters, see the *Administration Guide*.

See Also

"sqlfrsys - Reset Database Manager Configuration" on page 266

"sqlfusys - Update Database Manager Configuration" on page 272

"sqlfxsys - Get Database Manager Configuration" on page 278.

sqlfrdb - Reset Database Configuration

Resets the configuration file of a specific database to the system defaults.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. An explicit attachment is not required. If the database is listed as remote, an instance attachment to the remote node is established for the duration of the call.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Reset Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfrdb (
    _SQLOLDCHAR * pDbAlias,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Reset Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgrdb (
    unsigned short DbAliasLen,
    struct sqlca * pSqlca,
    char * pDbAlias);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDbAlias
Input. A string containing the database alias.

REXX API Syntax

```
RESET DATABASE CONFIGURATION FOR dbname
```

REXX API Parameters

dbname
Alias of the database associated with the configuration file.

Sample Programs

C	\sqllib\samples\c\dbconf.c
COBOL	\sqllib\samples\cobol\dbconf.cbl
REXX	\sqllib\samples\rexx\dbconf.cmd

Usage Notes

This API resets the entire configuration (except for non-updatable parameters).

To view or print a list of the current database configuration parameters for a database, use "sqlfxdb - Get Database Configuration" on page 275.

To view the default values for database configuration parameters, use "sqlfddb - Get Database Configuration Defaults" on page 259.

To change the value of a configurable parameter, use "sqlfudb - Update Database Configuration" on page 268.

Changes to the database configuration file become effective only after they are loaded into memory. All applications must disconnect from the database before this can occur.

If an error occurs, the database configuration file does not change.

The database configuration file cannot be reset if the checksum is invalid. This may occur if the database configuration file is changed without using the appropriate API. If this happens, the database must be restored to reset the database configuration file.

For a brief description of the database configuration parameters, see the *Command Reference*. For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfddb - Get Database Configuration Defaults" on page 259

"sqlfudb - Update Database Configuration" on page 268

"sqlfxdb - Get Database Configuration" on page 275.

sqlfrsys - Reset Database Manager Configuration

Resets the parameters in the database manager configuration file to the system defaults.

Authorization

sysadm

Required Connection

None or instance. An instance attachment is not required to perform database manager configuration operations at the current instance (as defined by the value of the **DB2INSTANCE** environment variable), but is required to perform database manager configuration operations at other instances. To reset the database manager configuration for another instance, it is necessary to first attach to that instance.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Reset Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfrsys (
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Reset Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgrsys (
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
RESET DATABASE MANAGER CONFIGURATION
```

Sample Programs

C	\sqllib\samples\c\dbmconf.c
COBOL	\sqllib\samples\cobol\dbmconf.cbl
REXX	\sqllib\samples\rexx\dbmconf.cmd

Usage Notes

If an attachment to a remote instance (or a different local instance) exists, the database manager configuration parameters for the attached server are reset; otherwise, the local database manager configuration parameters are reset.

This API resets the entire configuration (except for non-updatable parameters).

To view or print a list of the current database manager configuration parameters, use "sqlfxsys - Get Database Manager Configuration" on page 278.

To view the default values for database manager configuration parameters, use "sqlfdsys - Get Database Manager Configuration Defaults" on page 261.

To change the value of a configurable parameter, use "sqlfusys - Update Database Manager Configuration" on page 272.

Most changes to the database manager configuration file become effective only after they are loaded into memory. For a server configuration parameter, this occurs during execution of **db2start**. For a client configuration parameter, this occurs when the application is restarted.

If an error occurs, the database manager configuration file does not change.

The database manager configuration file cannot be reset if the checksum is invalid. This may occur if the database manager configuration file is changed without using the appropriate API. If this happens, the database manager must be installed again to reset the database manager configuration file.

For a brief description of the database manager configuration parameters, see the *Command Reference*. For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfdsys - Get Database Manager Configuration Defaults" on page 261

"sqlfusys - Update Database Manager Configuration" on page 272

"sqlfxsys - Get Database Manager Configuration" on page 278.

sqlfudb - Update Database Configuration

Modifies individual entries in a specific database configuration file.

A database configuration file resides on every node on which the database has been created.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Instance. An explicit attachment is not required. If the database is listed as remote, an instance attachment to the remote node is established for the duration of the call.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Update Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfudb (
    _SQLOLDCHAR * pDbAlias,
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Update Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgudb (
    unsigned short DbAliasLen,
    unsigned short NumItems,
    unsigned short * pItemListLens,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca,
    char * pDbAlias);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

NumItems
Input. Number of entries being modified. The minimum valid value is 1.

pItemListLens
Input. An array of 2-byte unsigned integers representing the length of each of the new configuration field values in the *pItemList*. It is necessary to provide lengths for those fields that contain strings only, such as *newlogpath*. If, for example, *newlogpath* is the fifth element in the *pItemList* array, its length must be the fifth element in the *pItemListLens* array.

pItemList
Input. Pointer to an array of *NumItems sqlfupd* structures, each containing a token field indicating which value to update, and a pointer field indicating the new value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDbAlias
Input. A string containing the database alias.

REXX API Syntax

```
UPDATE DATABASE CONFIGURATION FOR dbname USING :values
```

REXX API Parameters

dbname
Alias of the database associated with the configuration file.

values A compound REXX host variable containing tokens indicating which configuration fields are to be modified. The application provides the token and the new value for each field. The following are elements of a variable, where XXX represents the host variable name:

XXX.0 Twice the number of fields supplied (number of data elements in the remainder of the variable)

XXX.1 First token

XXX.2 Value supplied for the first field

XXX.3 Second token

XXX.4 Value supplied for the second field

XXX.5 and so on.

Sample Programs

C	\sqllib\samples\c\dbconf.c
COBOL	\sqllib\samples\cobol\dbconf.cbl
REXX	\sqllib\samples\rexx\dbconf.cmd

Usage Notes

To view or print a list of the database configuration parameters, use "sqlfxdb - Get Database Configuration" on page 275.

To view the default values for database configuration parameters, use "sqlfddb - Get Database Configuration Defaults" on page 259.

To reset the database configuration parameters to the recommended defaults, use "sqlfrdb - Reset Database Configuration" on page 263.

The default values of these parameters may differ for each type of database node configured (server, client, or server with remote clients). See the *Administration Guide* for the ranges and the default values that can be set on each node type. The valid *token* values for each configuration entry are listed in Table 53 on page 499.

Not all parameters can be updated.

Most changes to the database configuration file become effective only after they are loaded into memory. All applications must disconnect from the database before this can occur.

If an error occurs, the database configuration file does not change.

The database configuration file cannot be updated if the checksum is invalid. This may occur if the database configuration file is changed without using the appropriate API. If this happens, the database must be restored to reset the database configuration file.

For a brief description of the database configuration parameters, see the *Command Reference*. For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfddb - Get Database Configuration Defaults" on page 259

"sqlfrdb - Reset Database Configuration" on page 263

"sqlfxdb - Get Database Configuration" on page 275.

sqlfusys - Update Database Manager Configuration

Modifies individual entries in the database manager configuration file.

Authorization

sysadm

Required Connection

None or instance. An instance attachment is not required to perform database manager configuration operations at the current instance (as defined by the value of the **DB2INSTANCE** environment variable), but is required to perform database manager configuration operations at other instances. To update the database manager configuration for another instance, it is necessary to first attach to that instance.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Update Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfusys (
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Update Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgusys (
    unsigned short NumItems,
    unsigned short * pItemListLens,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

NumItems
Input. Number of entries being modified. The minimum valid value is 1.

pItemListLens
Input. An array of 2-byte unsigned integers representing the length of

each of the new configuration field values in the *pItemList*. It is necessary to provide lengths for those fields that contain strings only, such as *dftdbpath*. If, for example, *dftdbpath* is the fifth element in the *pItemList* array, its length must be the fifth element in the *pItemListLens* array.

pItemList
Input. Pointer to an array of *NumItems sqlfupd* structures, each containing a token field indicating which value to update, and a pointer field indicating the new value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
UPDATE DATABASE MANAGER CONFIGURATION USING :values
```

REXX API Parameters

values A compound REXX host variable containing tokens that indicate the configuration fields to be modified. The application provides the token and the new value for each field. The following are elements of a variable, where XXX represents the host variable name:

XXX.0	Number of elements in the variable. This value is two times the number of fields to modify.
XXX.1	First token
XXX.2	New value for the first field
XXX.3	Second token
XXX.4	New value for the second field
XXX.5	and so on.

Sample Programs

C	\sqllib\samples\c\dbmconf.c
COBOL	\sqllib\samples\cobol\dbmconf.cbl
REXX	\sqllib\samples\rexx\dbmconf.cmd

Usage Notes

If an attachment to a remote instance (or a different local instance) exists, the database manager configuration parameters for the attached server are updated; otherwise, the local database manager configuration parameters are updated.

To view or print a list of the database manager configuration parameters, use "sqlfxsys - Get Database Manager Configuration" on page 278.

To reset the database manager configuration parameters to the recommended database manager defaults, use "sqlfrsys - Reset Database Manager Configuration" on page 266.

The default values of these parameters may differ for each type of database node configured (server, client, or server with remote clients). See the *Administration Guide* for the ranges and the default values that can be set on each node type. The valid *token* values for each configuration entry are listed in Table 55 on page 502.

Not all parameters can be updated.

Most changes to the database manager configuration file become effective only after they are loaded into memory. For a server configuration parameter, this occurs during execution of **db2start**. For a client configuration parameter, this occurs when the application is restarted.

If an error occurs, the database manager configuration file does not change.

The database manager configuration file cannot be updated if the checksum is invalid. This may occur if the database manager configuration file is changed without using the appropriate API. If this happens, the database manager must be reinstalled to reset the database manager configuration file.

For a brief description of the database manager configuration parameters, see the *Command Reference*. For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfdsys - Get Database Manager Configuration Defaults" on page 261

"sqlfrsys - Reset Database Manager Configuration" on page 266

"sqlfxsys - Get Database Manager Configuration" on page 278.

sqlfxdb - Get Database Configuration

Returns the values of individual entries in a database configuration file.

For a brief description of the database configuration parameters, see the *Command Reference*. For detailed information about these parameters, see the *Administration Guide*.

Scope

This API returns information only for the node from which it is called.

Authorization

None

Required Connection

Instance. It is not necessary to call ATTACH before getting the configuration of a remote database. If the database is cataloged as remote, an instance attachment to the remote node is established for the duration of the call.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfxdb (
    _SQLOLDCHAR * pDbAlias,
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgxdb (
    unsigned short DbAliasLen,
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca,
    char * pDbAlias);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

NumItems
Input. Number of entries to be returned. The minimum valid value is 1.

pItemList
Input/Output. Pointer to an array of *NumItem sqlfupd* structures, each containing a token field indicating which value to return, and a pointer field indicating where to place the configuration value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pDbAlias
Input. A string containing the database alias.

REXX API Syntax

```
GET DATABASE CONFIGURATION FOR database_alias USING :values
```

REXX API Parameters

database_alias
Alias of the database associated with a specific database configuration file.

values A compound REXX host variable containing tokens that indicate the configuration fields to be returned. The application provides the token and the API returns the value. The following are elements of a variable, where XXX represents the host variable name:

XXX.0	Twice the number of fields returned (number of data elements in the remainder of the variable)
XXX.1	First token
XXX.2	Value returned for the first field
XXX.3	Second token
XXX.4	Value returned for the second field
XXX.5	and so on.

Sample Programs

C \sqllib\samples\c\dbconf.c

COBOL \sqllib\samples\cobol\dbconf.cbl

REXX \sqllib\samples\rexx\dbconf.cmd

Usage Notes

Entries in the database configuration file that are not listed in the token values for *pItemList* are not accessible to the application.

The application is responsible for allocating sufficient memory for each data element returned. For example, the value returned for *newlogpath* can be up to 242 bytes in length.

If an error occurs, the information returned is not valid. If the configuration file is invalid, an error message is returned. The database must be restored from a backup version.

To set the database configuration parameters to the database manager defaults, use "sqlfrdb - Reset Database Configuration" on page 263.

For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfddb - Get Database Configuration Defaults" on page 259

"sqlfrdb - Reset Database Configuration" on page 263

"sqlfudb - Update Database Configuration" on page 268.

sqlfxsys - Get Database Manager Configuration

Returns the values of individual entries in the database manager configuration file.

For a brief description of the database manager configuration parameters, see the *Command Reference*. For detailed information about these parameters, see the *Administration Guide*.

Authorization

None

Required Connection

An instance attachment is not required to perform database manager configuration operations at the current instance (as defined by the value of the **DB2INSTANCE** environment variable), but is required to perform database manager configuration operations at other instances. To display the database manager configuration for another instance, it is necessary to first attach to that instance.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlfxsys (
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Database Manager Configuration */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgxsys (
    unsigned short NumItems,
    struct sqlfupd * pItemList,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

NumItems
Input. Number of entries being modified. The minimum valid value is 1.

pItemList
Input/Output. Pointer to an array of *NumItems sqlfupd* structures, each containing a token field indicating which value to return, and a pointer field indicating where to place the configuration value. For more information about this structure, see "SQLFUPD" on page 499.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
GET DATABASE MANAGER CONFIGURATION USING :values
```

REXX API Parameters

values A compound host variable containing tokens indicating the configuration fields to be returned. The application provides the token, and the API returns the value. XXX represents the host variable name:

XXX.0	The actual number of data elements in the remainder of the variable
XXX.1	First token
XXX.2	Value returned for the first field
XXX.3	Second token
XXX.4	Value returned for the second field
XXX.5	and so on.

Sample Programs

C	\sqllib\samples\c\dbmconf.c
COBOL	\sqllib\samples\cobol\dbmconf.cbl
REXX	\sqllib\samples\rexx\dbmconf.cmd

Usage Notes

If an attachment to a remote instance (or a different local instance) exists, the database manager configuration parameters for the attached server are returned; otherwise, the local database manager configuration parameters are returned.

The application is responsible for allocating sufficient memory for each data element returned. For example, the value returned for *dftdbpath* can be up to 215 bytes in length.

If an error occurs, the information returned is invalid. If the configuration file is invalid, an error message is returned. The user must install the database manager again to recover.

To set the configuration parameters to the default values shipped with the database manager, use "sqlfrsys - Reset Database Manager Configuration" on page 266.

For more information about these parameters, see the *Administration Guide*.

See Also

"sqlfdsys - Get Database Manager Configuration Defaults" on page 261

"sqlfrsys - Reset Database Manager Configuration" on page 266

"sqlfusys - Update Database Manager Configuration" on page 272.

sqlgaddr - Get Address

Places the address of a variable into another variable. It is used in host languages, such as FORTRAN and COBOL, that do not provide pointer manipulation.

Authorization

None

Required Connection

None

API Include File

sqlutil.h

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Address */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgaddr (
    char * pVariable,
    char ** ppOutputAddress);
/* ... */
```

API Parameters

pVariable
Input. Variable whose address is to be returned.

ppOutputAddress
Output. A 4-byte area into which the variable address is returned.

Usage Notes

This API is used in the COBOL and FORTRAN languages only.

See Also

"sqlgdref - Dereference Address" on page 282.

sqlgdref - Dereference Address

Copies data from a buffer that is defined by a pointer, into a variable that is directly accessible by the application. It is used in host languages, such as FORTRAN and COBOL, that do not provide pointer manipulation. This API can be used to obtain results from APIs, such as "sqlengne - Get Next Node Directory Entry" on page 225, that return a pointer to the desired data.

Authorization

None

Required Connection

None

API Include File

sqlutil.h

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Dereference Address */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdref (
    unsigned int NumBytes,
    char * pTargetBuffer,
    char ** ppSourceBuffer);
/* ... */
```

API Parameters

NumBytes
Input. An integer representing the number of bytes to be transferred.

pTargetBuffer
Output. Area into which the data are moved.

ppSourceBuffer
Input. A pointer to the area containing the desired data.

Usage Notes

This API is used in the COBOL and FORTRAN languages only.

See Also

"sqlgaddr - Get Address" on page 281.

sqlgmcpy - Copy Memory

Copies data from one memory area to another. It is used in host languages, such as FORTRAN and COBOL, that do not provide memory block copy functions.

Authorization

None

Required Connection

None

API Include File

sqlutil.h

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Copy Memory */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgmcpy (
    void * pTargetBuffer,
    const void * pSource,
    sqluint32 NumBytes);
/* ... */
```

API Parameters

pTargetBuffer
Output. Area into which to move the data.

pSource
Input. Area from which to move the data.

NumBytes
Input. A 4-byte unsigned integer representing the number of bytes to be transferred.

Usage Notes

This API is used in the COBOL and FORTRAN languages only.

See Also

"sqlgaddr - Get Address" on page 281.

sqlogstt - Get SQLSTATE Message

Retrieves the message text associated with an SQLSTATE.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
/* File: sql.h */
/* API: Get SQLSTATE Message */
/* ... */
SQL_API_RC SQL_API_FN
  sqlogstt (
    char * pBuffer,
    short BufferSize,
    short LineWidth,
    char * pSqlstate);
/* ... */
```

Generic API Syntax

```
/* File: sql.h */
/* API: Get SQLSTATE Message */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggstt (
    short BufferSize,
    short LineWidth,
    char * pSqlstate,
    char * pBuffer);
/* ... */
```

API Parameters

BufferSize
Input. Size, in bytes, of a string buffer to hold the retrieved message text.

LineWidth
Input. The maximum line width for each line of message text. Lines are broken on word boundaries. A value of zero indicates that the message text is returned without line breaks.

pSqlstate
Input. A string containing the SQLSTATE for which the message text

is to be retrieved. This field is alphanumeric and must be either five-digit (specific SQLSTATE) or two-digit (SQLSTATE class, first two digits of an SQLSTATE). This field does not need to be NULL-terminated if 5 digits are being passed in, but must be NULL-terminated if 2 digits are being passed.

pBuffer
Output. A pointer to a string buffer where the message text is to be placed. If the message must be truncated to fit in the buffer, the truncation allows for the null string terminator character.

REXX API Syntax

```
GET MESSAGE FOR SQLSTATE sqlstate INTO :msg [LINEWIDTH width]
```

REXX API Parameters

sqlstate
The SQLSTATE for which the message text is to be retrieved.

msg REXX variable into which the message is placed.

width Maximum line width for each line of the message text. The line is broken on word boundaries. If a value is not specified, or this parameter is set to 0, the message text returns without line breaks.

Sample Programs

C	\sqllib\samples\c\utilapi.c
COBOL	\sqllib\samples\cobol\checkerr.cbl

Usage Notes

One message is returned per call.

A LF/NULL sequence is placed at the end of each message.

If a positive line width is specified, LF/NULL sequences are inserted between words so that the lines do not exceed the line width.

If a word is longer than a line width, the line is filled with as many characters as will fit, a LF/NULL is inserted, and the remaining characters are placed on the next line.

Return Codes

Code	Message
+i	Positive integer indicating the number of bytes in the formatted message. If this is greater than the buffer size input by the caller, the message is truncated.

-1 Insufficient memory available for message formatting services to function. The requested message is not returned.

-2 The SQLSTATE is in the wrong format. It must be alphanumeric and be either 2 or 5 digits in length.

-3 Message file inaccessible or incorrect.

-4 Line width is less than zero.

-5 Invalid *sqlca*, bad buffer address, or bad buffer length.

If the return code is -1 or -3, the message buffer will contain further information about the problem.

See Also

"sqlaintp - Get Error Message" on page 90.

sqluadau - Get Authorizations

Reports the authorities of the current user from values found in the database manager configuration file and the authorization system catalog view (SYSCAT.DBAUTH).

Authorization

None

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Authorizations */
/* ... */
SQL_API_RC SQL_API_FN
  sqluadau (
    struct sql_authorizations * pAuthorizations,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Authorizations */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgadau (
    struct sql_authorizations * pAuthorizations,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

pAuthorizations
Input/Output. Pointer to the *sql_authorizations* structure. This array of short integers indicates which authorizations the current user holds. The first element in the structure, *sql_authorizations_len*, must be initialized to the size of the buffer being passed, prior to calling this API. For more information about the *sql_authorizations* structure, see "SQL-AUTHORIZATIONS" on page 434.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
GET AUTHORIZATIONS :value
```

REXX API Parameters

value A compound REXX host variable to which the authorization level is returned. In the following, XXX represents the host variable name. Values are `0` for no, and `1` for yes.

XXX.0	Number of elements in the variable (always 18)
XXX.1	Direct SYSADM authority
XXX.2	Direct DBADM authority
XXX.3	Direct CREATETAB authority
XXX.4	Direct BINDADD authority
XXX.5	Direct CONNECT authority
XXX.6	Indirect SYSADM authority
XXX.7	Indirect DBADM authority
XXX.8	Indirect CREATETAB authority
XXX.9	Indirect BINDADD authority
XXX.10	Indirect CONNECT authority
XXX.11	Direct SYSCTRL authority
XXX.12	Indirect SYSCTRL authority
XXX.13	Direct SYSMAINT authority
XXX.14	Indirect SYSMAINT authority
XXX.15	Direct CREATE_NOT_FENC authority
XXX.16	Indirect CREATE_NOT_FENC authority
XXX.17	Direct IMPLICIT_SCHEMA authority
XXX.18	Indirect IMPLICIT_SCHEMA authority.
XXX.19	Direct LOAD authority.
XXX.20	Indirect LOAD authority.

Sample Programs

C	\sqllib\samples\c\dbauth.sqc
COBOL	\sqllib\samples\cobol\dbauth.sqb
REXX	\sqllib\samples\rexx\dbauth.cmd

Usage Notes

Direct authorities are acquired by explicit commands that grant the authorities to a user ID. Indirect authorities are based on authorities acquired by the groups to which a user belongs.

Note: PUBLIC is a special group to which all users belong.

If there are no errors, each element of the *sql_authorizations* structure contains a `0` or a `1`. A value of `1` indicates that the user holds that authorization; `0` indicates that the user does not.

sqlubkp - Backup Database

Creates a backup copy of a database or a table space.

Scope

This API only affects the node on which it is executed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

Database. This API automatically establishes a connection to the specified database.

Note: If a connection to the specified database already exists, it will be used for the backup operation. The connection will be terminated at the completion of the backup.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Backup Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlubkp (
    char * pDbAlias,
    sqluint32     BufferSize,
    sqluint32     BackupMode,
    sqluint32     BackupType,
    sqluint32     CallerAction,
    char * pApplicationId,
    char * pTimestamp,
    sqluint32     NumBuffers,
    struct sqlu_tablespace_bkrst_list * pTablespaceList,
    struct sqlu_media_list * pMediaTargetList,
    char * pUserName,
    char * pPassword,
    void * pReserved2,
    sqluint32 VendorOptionsSize,
    void * pVendorOptions,
    sqluint32 Parallelism,
    sqluint32 * pBackupSize,
    void * pReserved4,
    void * pReserved3,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Backup Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgbkp (
    unsigned short DbAliasLen,
    unsigned short UserNameLen,
    unsigned short PasswordLen,
    unsigned short * pReserved1,
    char * pDbAlias,
    sqluint32 BufferSize,
    sqluint32 BackupMode,
    sqluint32 BackupType,
    sqluint32 CallerAction,
    char * pApplicationId,
    char * pTimestamp,
    sqluint32 NumBuffers,
    struct sqlu_tablespace_bkrst_list * pTablespaceList,
    struct sqlu_media_list * pMediaTargetList,
    char * pUserName,
    char * pPassword,
    void * pReserved2,
    sqluint32 VendorOptionsSize,
    void * pVendorOptions,
    sqluint32 Parallelism,
    sqluint32 * pBackupSize,
    void * pReserved4,
    void * pReserved3,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

UserNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the user name. Set to zero if no user name is provided.

PasswordLen
Input. A 2-byte unsigned integer representing the length in bytes of the password. Set to zero if no password is provided.

pReserved1.
Reserved for future use.

pDbAlias
Input. A string containing the database alias (as cataloged in the system database directory) of the database to back up.

BufferSize
Input. Backup buffer size in 4KB allocation units (pages). Minimum is 8 units. The default is 1024 units.

BackupMode
Input. Specifies the backup mode. Valid values (defined in `sqlutil`) are:

SQLUB_OFFLINE
Offline gives an exclusive connection to the database.

SQLUB_ONLINE
Online allows database access by other applications while the backup operation occurs.

Note: An online backup operation may time out if there is an IX lock on `sysibm.systables`, because the DB2 backup utility acquires S locks on SMS LOB objects and IN locks on all other objects.

BackupType
Input. Specifies the type of backup to be taken. Valid values (defined in `sqlutil`) are:

SQLUB_FULL
Full database backup.

SQLUB_TABLESPACE
Table space level backup. For a table space level backup, provide a list of table spaces in the *pTablespaceList* parameter.

CallerAction
Input. Specifies action to be taken. Valid values (defined in `sqlutil`) are:

SQLUB_BACKUP
Start the backup.

SQLUB_NOINTERRUPT
Start the backup. Specifies that the backup will run unattended, and that scenarios which normally require user intervention will either be attempted without first returning to the caller, or will generate an error. Use this caller action, for example, if it is known that all of the media required for the backup have been mounted, and utility prompts are not desired.

SQLUB_CONTINUE
Continue the backup after the user has performed some action requested by the utility (mount a new tape, for example).

SQLUB_TERMINATE
Terminate the backup after the user has failed to perform some action requested by the utility.

SQLUB_DEVICE_TERMINATE
Remove a particular device from the list of devices used by backup. When a particular medium is full, backup will return a warning to the caller (while continuing to process using the remaining devices). Call backup again with this caller action to remove the device which generated the warning from the list of devices being used.

SQLUB_PARM_CHECK
Used to validate parameters without performing a backup. This option does not terminate the database connection after the call returns. After successful return of this call, it is expected that the user will issue a call with `SQLUB_CONTINUE` to proceed with the action.

SQLUB_PARM_CHECK_ONLY
Used to validate parameters without performing a backup. Before this call returns, the database connection established by this call is terminated, and no subsequent call is required.

pApplicationId
Output. Supply a buffer of length SQLU_APPLID_LEN+1 (defined in `sqlutil`). The API will return a string identifying the agent servicing the application. Can be used to obtain information about the progress of the backup operation using the database monitor.

pTimestamp
Output. Supply a buffer of length SQLU_TIME_STAMP_LEN+1 (defined in `sqlutil`). The API will return the time stamp of the backup image.

NumBuffers
Input. Specifies number of backup buffers to be used.

pTablespaceList
Input. List of table spaces to be backed up. Required for table space level backup only. See structure "SQLU-TABLESPACE-BKRST-LIST" on page 523.

pMediaTargetList
Input. This structure allows the caller to specify the destination for the backup operation. The information provided depends on the value of the *media_type* field. The valid values for *media_type* (defined in `sqlutil`) are:

SQLU_LOCAL_MEDIA
Local devices (a combination of tapes, disks, or diskettes). Provide a list of *sqlu_media_entry* structures. On OS/2 or the Windows operating system, the entries can be directory paths only, not tape device names.

SQLU_TSM_MEDIA
TSM. If an *sqlu_media_entry* structure is not being used to specify a path for the backup image, initialize the *media* pointer in the *sqlu_media_list_targets* structure to NULL. The TSM shared library provided with DB2 is used. If a different version of the TSM shared library is desired, use `SQLU_OTHER_MEDIA` and provide the shared library name.

SQLU_OTHER_MEDIA
Vendor product. Provide the shared library name in an *sqlu_vendor* structure.

SQLU_USER_EXIT
User exit. No additional input is required (available on OS/2 only).

For more information, see structure "SQLU-MEDIA-LIST" on page 518, and the *Administration Guide*.

pUserName
Input. A string containing the user name to be used when attempting a connection.

pPassword
Input. A string containing the password to be used with the user name.

pReserved2
Reserved for future use.

VendorOptionsSize
Input. The length of the *pVendorOptions* field which cannot exceed 65535 bytes.

pVendorOptions
Input. Used to pass information from the application to the vendor functions. This data structure must be flat; that is, no level of indirection is supported. Note that byte-reversal is not done, and code page is not checked for this data.

Parallelism
Input. Degree of parallelism (number of buffer manipulators).

pBackupSize
Output. Size of the backup image (in MB). Can be set to NULL.

pReserved4
Reserved for future use.

pReserved3
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
BACKUP DATABASE dbalias USING :value [USER username USING password]

[TABLESPACE :tablespacenames] [ONLINE]

[LOAD vendor-library [OPTIONS vendor-options] [OPEN num-sessions SESSIONS] |
 TO :target-area |
 USE TSM [OPEN num-sessions SESSIONS] |
 USER_EXIT]

[ACTION caller-action] [WITH num-buffers BUFFERS] [BUFFERSIZE buffer-size]
[PARALLELISM parallelism-degree]
```

REXX API Parameters

dbalias
Alias of the database to be backed up.

value A compound REXX host variable to which the database backup information is returned. In the following, XXX represents the host variable name:

XXX.0	Number of elements in the variables (always 2)
XXX.1	The time stamp of the backup image
XXX.2	An application ID that identifies the agent that serves the application.

username
Identifies the user name under which to back up the database.

password
The password used to authenticate the user name.

tablespacenames
A compound REXX host variable containing a list of table spaces to be backed up. In the following, XXX is the name of the host variable:

XXX.0	Number of table spaces to be backed up
XXX.1	First table space name

XXX.2 Second table space name

XXX.3 and so on.

vendor-library
The name of the shared library (DLL on OS/2 or the Windows operating system) containing the vendor backup and restore I/O functions to be used. It may contain the full path. If the full path is not given, defaults to the path on which the user exit program resides.

vendor-options
Information required by the vendor functions.

num-sessions
The number of I/O sessions to be used with TSM or the vendor product.

target-area
Local devices. Allows a combination of tapes, disks or diskettes. Provide a list in "SQLU-MEDIA-LIST" on page 518. On OS/2 or the Windows operating system, the entries can be directory paths only, not tape device names.

caller-action
Specifies action to be taken. Valid values are:

SQLUB_BACKUP
Start the backup.

SQLUB_NOINTERRUPT
Start the backup. Specifies that the backup will run unattended, and that scenarios which normally require user intervention will either be attempted without first returning to the caller, or will generate an error. Use this caller action, for example, if it is known that all of the media required for the backup have been mounted, and utility prompts are not desired.

SQLUB_CONTINUE
Continue the backup after the user has performed some action requested by the utility (mount a new tape, for example).

SQLUB_TERMINATE
Terminate the backup after the user has failed to perform some action requested by the utility.

SQLUB_DEVICE_TERMINATE
Remove a particular device from the list of devices used by backup. When a particular medium is full, backup will return a warning to the caller (while continuing to process using the

remaining devices). Call backup again with this caller action to remove the device which generated the warning from the list of devices being used.

SQLUB_PARM_CHECK
Used to validate parameters without performing a backup.

num-buffers
Number of backup buffers to be used.

buffer-size
Backup buffer size in allocation units of 4KB. Minimum is 8 units.

parallelism-degree
Number of buffer manipulators.

Sample Programs

C	\sqllib\samples\c\backrest.c
COBOL	\sqllib\samples\cobol\backrest.cbl

Usage Notes

For information about database level backup, table space level backup, online and offline backup, backup file names, and supported devices, see the *Command Reference*.

For a general discussion of backup, see "Recovering a Database" in the *Administration Guide*.

See Also

"sqlemgdb - Migrate Database" on page 221

"sqluroll - Rollforward Database" on page 397

"sqlurestore - Restore Database" on page 381.

sqludrdt - Redistribute Nodegroup

Redistributes data across the nodes in a nodegroup. The current data distribution, whether it is uniform or skewed, can be specified. The redistribution algorithm selects the partitions to be moved based on the current data distribution.

This API can only be called from the catalog node. Use the LIST DATABASE DIRECTORY command (see the *Command Reference*) to determine which node is the catalog node for each database.

Scope

This API affects all nodes in the nodegroup.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *dbadm*

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Redistribute Nodegroup */
/* ... */
SQL_API_RC SQL_API_FN
  sqludrdt (
    char * pNodeGroupName,
    char * pTargetPMapFileName,
    char * pDataDistFileName,
    SQL_PDB_NODE_TYPE * pAddList,
    unsigned short AddCount,
    SQL_PDB_NODE_TYPE * pDropList,
    unsigned short DropCount,
    unsigned char DataRedistOption,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Redistribute Nodegroup */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgdrdt (
    unsigned short NodeGroupNameLen,
    unsigned short TargetPMapFileNameLen,
    unsigned short DataDistFileNameLen,
    char * pNodeGroupName,
    char * pTargetPMapFileName,
    char * pDataDistFileName,
    SQL_PDB_NODE_TYPE * pAddList,
    unsigned short AddCount,
    SQL_PDB_NODE_TYPE * pDropList,
    unsigned short DropCount,
    unsigned char DataRedistOption,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

NodeGroupNameLen
The length of the name of the nodegroup.

TargetPMapFileNameLen
The length of the name of the target partitioning map file.

DataDistFileNameLen
The length of the name of the data distribution file.

pNodeGroupName
The name of the nodegroup to be redistributed.

pTargetPMapFileName
The name of the file that contains the target partitioning map. If a directory path is not specified as part of the file name, the current directory is used. This parameter is used when the *DataRedistOption* value is `T`. The file should be in character format and contain either 4 096 entries (for a multi-node nodegroup) or 1 entry (for a single-node nodegroup). Entries in the file indicate node numbers. Entries can be in free format.

pDataDistFileName
The name of the file that contains input distribution information. If a directory path is not specified as part of the file name, the current directory is used. This parameter is used when the *DataRedistOption* value is `U`. The file should be in character format and contain 4 096 positive integer entries. Each entry in the file should indicate the weight of the corresponding partition. The sum of the 4 096 values should be less than or equal to 4 294 967 295.

pAddList
The list of nodes to add to the nodegroup during the data redistribution. Entries in the list must be in the form: SQL_PDB_NODE_TYPE.

AddCount
The number of nodes to add to the nodegroup.

pDropList
The list of nodes to drop from the nodegroup during the data redistribution. Entries in the list must be in the form: SQL_PDB_NODE_TYPE.

DropCount
The number of nodes to drop from the nodegroup.

DataRedistOption
A single character that indicates the type of data redistribution to be done. Possible values are:

U Specifies to redistribute the nodegroup to achieve a balanced distribution. If *pDataDistFileName* is null, the current data distribution is assumed to be uniform (that is, each hash partition represents the same amount of data). If *pDataDistFileName* is not null, the values in this file are assumed to represent the current data distribution. When the *DataRedistOption* is `U`, the *pTargetPMapFileName* should be null.

Nodes specified in the add list are added, and nodes specified in the drop list are dropped from the nodegroup.

T Specifies to redistribute the nodegroup using *pTargetPMapFileName*. For this option, *pDataDistFileName*, *pAddList*, and *pDropList* should be null, and both *AddCount* and *DropCount* must be zero.

C Specifies to continue a redistribution operation that failed. For this option, *pTargetPMapFileName*, *pDataDistFileName*, *pAddList*, and *pDropList* should be null, and both *AddCount* and *DropCount* must be zero.

R Specifies to roll back a redistribution operation that failed. For this option, *pTargetPMapFileName*, *pDataDistFileName*, *pAddList*, and *pDropList* should be null, and both *AddCount* and *DropCount* must be zero.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Usage Notes

When a redistribution operation is done, a message file is written to:

- The `$HOME/sqllib/redist` directory on UNIX based systems, using the following format for subdirectories and file name: *database-name.nodegroup-name.timestamp*.
- The `$HOME\sqllib\redist\` directory on OS/2 or the Windows operating system, using the following format for subdirectories and file name: *database-name\first-eight-characters-of-the-nodegroup-name\date\time*.

The time stamp value is the time at which the API was called.

This utility performs intermittent COMMITs during processing.

Use the ALTER NODEGROUP statement to add nodes to a nodegroup. This statement permits one to define the containers for the table spaces associated with the nodegroup. See the *SQL Reference* for details.

Note: DB2 Parallel Edition for AIX Version 1 syntax, with ADD NODE and DROP NODE options, is supported for users with *sysadm* or *sysctrl* authority. For ADD NODE, containers are created like the containers on the lowest node number of the existing nodes within the nodegroup.

All packages having a dependency on a table that has undergone redistribution are invalidated. It is recommended to explicitly rebind such packages after the redistribute nodegroup operation has completed. Explicit rebinding eliminates the initial delay in the execution of the first SQL request for the invalid package. The redistribute message file contains a list of all the tables that have undergone redistribution.

It is also recommended to update statistics by issuing "sqlustat - Runstats" on page 407 after the redistribute nodegroup operation has completed.

Nodegroups containing replicated summary tables or tables defined with DATA CAPTURE CHANGES cannot be redistributed.

Redistribution is not allowed if there are user temporary table spaces with existing declared temporary tables in the nodegroup.

See Also

"sqlarbnd - Rebind" on page 99.

sqluexpr - Export

Exports data from a database to one of several external file formats. The user specifies the data to be exported by supplying an SQL SELECT statement, or by providing hierarchical information for typed tables.

Authorization

One of the following:

- *sysadm*
- *dbadm*

or CONTROL or SELECT privilege on each participating table or view.

Required Connection

Database. If implicit connect is enabled, a connection to the default database is established.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Export */
/* ... */
SQL_API_RC SQL_API_FN
  sqluexpr (
    char * pDataFileName,
    sqlu_media_list * pLobPathList,
    sqlu_media_list * pLobFileList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pMsgFileName,
    short CallerAction,
    struct sqluexpt_out*  pOutputInfo,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Export */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgexpr (
    unsigned short DataFileNameLen,
    unsigned short FileTypeLen,
    unsigned short MsgFileNameLen,
    char * pDataFileName,
    sqlu_media_list * pLobPathList,
    sqlu_media_list * pLobFileList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pMsgFileName,
    short CallerAction,
    struct sqluexpt_out*  pOutputInfo,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DataFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the data file name.

FileTypeLen
Input. A 2-byte unsigned integer representing the length in bytes of the file type.

MsgFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the message file name.

pDataFileName
Input. A string containing the path and the name of the external file into which the data is to be exported.

pLobPathList
Input. An *sqlu_media_list* using *media_type* SQLU_LOCAL_MEDIA, and the *sqlu_media_entry* structure listing paths on the client where the LOB files are to be stored.

When file space is exhausted on the first path in this list, the API will use the second path, and so on.

For more information, see "SQLU-MEDIA-LIST" on page 518.

pLobFileList

Input. An *sqlu_media_list* using *media_type* `SQLU_CLIENT_LOCATION`, and the *sqlu_location_entry* structure containing base file names.

When the name space is exhausted using the first name in this list, the API will use the second name, and so on.

For more information, see "SQLU-MEDIA-LIST" on page 518.

When creating LOB files during an export operation, file names are constructed by appending the current base name from this list to the current path (from *pLobFilePath*), and then appending a 3-digit sequence number. For example, if the current LOB path is the directory `/u/foo/lob/path`, and the current LOB file name is `bar`, the created LOB files will be `/u/foo/lob/path/bar.001`, `/u/foo/lob/pah/bar.002`, and so on.

pDataDescriptor

Input. Pointer to an *sqldcol* structure specifying the column names for the output file. The value of the *dcolmeth* field determines how the remainder of the information provided in this parameter is interpreted by the export utility. Valid values for this parameter (defined in `sqlutil`) are:

SQL_METH_N
Names. Specify column names to be used in the output file.

SQL_METH_D
Default. Existing column names from the table are to be used in the output file. In this case, the number of columns and the column specification array are both ignored. The column names are derived from the output of the SELECT statement specified in *pActionString*.

For more information, see "SQLDCOL" on page 456.

pActionString

Input. Pointer to an *sqlchar* structure containing a valid dynamic SQL SELECT statement. The structure contains a 2-byte long field, followed by the characters that make up the SELECT statement. The SELECT statement specifies the data to be extracted from the database and written to the external file.

The columns for the external file (from *pDataDescriptor*), and the database columns from the SELECT statement, are matched according to their respective list/structure positions. The first column of data selected from the database is placed in the first column of the external file, and its column name is taken from the first element of the external column array.

For more information, see "SQLCHAR" on page 452.

Note: The syntax that is to be used for typed tables is described in the *Command Reference*.

pFileType

Input. A string that indicates the format of the data within the external file. Supported external file formats (defined in `sqlutil`) are:

SQL_DEL
Delimited ASCII, for exchange with dBase, BASIC, and the IBM Personal Decision Series programs, and many other database managers and file managers.

SQL_WSF
Worksheet formats for exchange with Lotus Symphony and 1-2-3 programs.

SQL_IXF
PC version of the Integrated Exchange Format, the preferred method for exporting data from a table. Data exported to this file format can later be imported or loaded into the same table or into another database manager table.

pFileTypeMod

Input. A pointer to an *sqldcol* structure containing a 2-byte long field, followed by an array of characters that specify one or more processing options. If this pointer is NULL, or the structure pointed to has zero characters, this action is interpreted as selection of a default specification.

Not all options can be used with all of the supported file types.

For more information, see "SQLCHAR" on page 452, and the *Command Reference*.

pMsgFileName

Input. A string containing the destination for error, warning, and informational messages returned by the utility. It can be the path and the name of an operating system file or a standard device. If the file already exists, it is overwritten. If it does not exist, a file is created.

CallerAction

Input. An action requested by the caller. Valid values (defined in `sqlutil`) are:

SQLU_INITIAL
Initial call. This value must be used on the first call to the API.

If the initial call or any subsequent call returns and requires the calling application to perform some action prior to completing the requested export operation, the caller action must be set to one of the following:

SQLU_CONTINUE
Continue processing. This value can only be used on subsequent calls to the API, after the initial call has returned with the utility requesting user input (for example, to respond to an end of tape condition). It specifies that the user action requested by the utility has completed, and the utility can continue processing the initial request.

SQLU_TERMINATE
Terminate processing. This value can only be used on subsequent calls to the API, after the initial call has returned with the utility requesting user input (for example, to respond to an end of tape condition). It specifies that the user action requested by the utility was not performed, and the utility is to terminate processing the initial request.

pOutputInfo
Output. Returns the number of records exported to the target file. For more information about this structure, see "SQLUEXPT-OUT" on page 525.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
EXPORT :stmt TO datafile OF filetype
[MODIFIED BY :filetmod] [USING :dcoldata]
MESSAGES msgfile [ROWS EXPORTED :number]

CONTINUE EXPORT

STOP EXPORT
```

REXX API Parameters

stmt A REXX host variable containing a valid dynamic SQL SELECT statement. The statement specifies the data to be extracted from the database.

datafile
Name of the file into which the data is to be exported.

filetype
The format of the data in the export file. The supported file formats are:

DEL Delimited ASCII

WSF Worksheet format

IXF PC version of Integrated Exchange Format.

filetmod
A host variable containing additional processing options (see the *Data Movement Utilities Guide and Reference*).

dcoldata
A compound REXX host variable containing the column names to be used in the export file. In the following, XXX represents the name of the host variable:

XXX.0 Number of columns (number of elements in the remainder of the variable).

XXX.1 First column name.

XXX.2 Second column name.

XXX.3 and so on.

If this parameter is NULL, or a value for *dcoldata* has not been specified, the utility uses the column names from the database table.

msgfile
File, path, or device name where error and warning messages are to be sent.

number
A host variable that will contain the number of exported rows.

Sample Programs

C	\sqllib\samples\c\impexp.sqc
COBOL	\sqllib\samples\cobol\impexp.sqb
REXX	\sqllib\samples\rexx\impexp.cmd

Usage Notes

Be sure to complete all table operations and release all locks before starting an export operation. This can be done by issuing a COMMIT after closing all cursors opened WITH HOLD, or by issuing a ROLLBACK.

Table aliases can be used in the SELECT statement.

The messages placed in the message file include the information returned from the message retrieval service. Each message begins on a new line.

The export utility produces a warning message whenever a character column with a length greater than 254 is selected for export to DEL format files.

A warning message is issued if the number of columns (*dcolnum*) in the external column name array, *pDataDescriptor*, is not equal to the number of columns generated by the SELECT statement. In this case, the number of columns written to the external file is the lesser of the two numbers. Excess database columns or external column names are not used to generate the output file.

If the `db2uexpm.bnd` module or any other shipped `.bnd` files are bound manually, the **format** option on the binder must not be used.

PC/IXF import should be used to move data between databases. If character data containing row separators is exported to a delimited ASCII (DEL) file and processed by a text transfer program (moving, for example, between OS/2 and AIX systems), fields containing the row separators will shrink or expand.

PC/IXF file format specifications permit migration of data between OS/2 (IBM Extended Services for OS/2, OS/2 Extended Edition and DB2 for OS/2) databases and DB2 for AIX databases via export, binary copying of files between OS/2 and AIX, and import. The file copying step is not necessary if the source and the target databases are both accessible from the same client.

DB2 Connect can be used to export tables from DRDA servers such as DB2 for OS/390, DB2 for VM and VSE, and DB2 for OS/400. Only PC/IXF export is supported.

The export utility will not create multiple-part PC/IXF files when invoked from an AIX system.

Index definitions for a table are included in the PC/IXF file when the contents of a single database table are exported to a PC/IXF file with a *pActionString* beginning with `SELECT * FROM tablename`, and the *pDataDescriptor* parameter specifying default names. Indexes are not saved for views, or if the SELECT clause of the *pActionString* includes a join. A WHERE clause, a GROUP BY clause, or a HAVING clause in the *pActionString* will not prevent the saving of indexes. In all of these cases, when exporting from typed tables, the entire hierarchy must be exported.

The export utility will store the NOT NULL WITH DEFAULT attribute of the table in an IXF file if the SELECT statement provided is in the form `SELECT * FROM tablename`.

When exporting typed tables, subselect statements can only be expressed by specifying the target table name and the WHERE clause. Fullselect and *select-statement* cannot be specified when exporting a hierarchy.

For file formats other than IXF, it is recommended that the traversal order list be specified, because it tells DB2 how to traverse the hierarchy, and what sub-tables to export. If this list is not specified, all tables in the hierarchy are exported, and the default order is the OUTER order. The alternative is to use the default order, which is the order given by the OUTER function.

Note: Use the same traverse order during an import operation. The load utility does not support loading hierarchies or sub-hierarchies.

DB2 Data Links Manager Considerations

To ensure that a consistent copy of the table and the corresponding files referenced by the DATALINK columns are copied for export, do the following:

1. Issue the command: QUIESCE TABLESPACES FOR TABLE tablename SHARE.

   This ensures that no update transactions are in progress when EXPORT is run.
2. Issue the EXPORT command.
3. Run the **dlfm_export** utility at each Data Links server. Input to the **dlfm_export** utility is the control file name, which is generated by the export utility. This produces a tar (or equivalent) archive of the files listed within the control file.
4. Issue the command: QUIESCE TABLESPACES FOR TABLE tablename RESET.

   This makes the table available for updates.

EXPORT is executed as an SQL application. The rows and columns satisfying the SELECT statement conditions are extracted from the database. For the DATALINK columns, the SELECT statement should not specify any scalar function.

Successful execution of EXPORT results in generation of the following files:

- An export data file as specified in the EXPORT command. A DATALINK column value in this file is in the format described on page 355. When the DATALINK column value is the SQL NULL value, handling is the same as that for other data types.
- Control files *server_name*, which are generated for each Data Links server (on the Windows NT operating system, a single control file, `ctrlfile.lst`, is used by all Data Links servers). These control files are placed in the directory <data-file path>/dlfm/YYYYMMDD/HHMMSS (on the Windows NT operating system, `ctrlfile.lst` is placed in the directory <data-file path>\dlfm\YYYYMMDD\HHMMSS). YYYYMMDD represents the date (year month day), and HHMMSS represents the time (hour minute second).

The **dlfm_export** utility is provided to export files from a Data Links server. This utility generates an archive file, which can be used to restore files in the target Data Links server.

Table 8. Valid File Type Modifiers (Export)

Modifier	Description
All File Formats	
lobsinfile	*lob-path* specifies the path to the files containing LOB values.
DEL (Delimited ASCII) File Format	
chardel*x*	*x* is a single character string delimiter. The default value is a double quotation mark ("). The specified character is used in place of double quotation marks to enclose a character string.[a] The single quotation mark (') can also be specified as a character string delimiter as follows: `modified by chardel''`

coldel*x*	*x* is a single character column delimiter. The default value is a comma (,). The specified character is used in place of a comma to signal the end of a column.[a]
	
	In the following example, `coldel;` causes the export utility to interpret any semicolon (;) it encounters as a column delimiter:
	`db2 "export to temp of del modified by coldel;`
	`select * from staff where dept = 20"`

datesiso	Date format. Causes all date data values to be exported in ISO format (*"YYYY-MM-DD"*).[b]
decplusblank	Plus sign character. Causes positive decimal values to be prefixed with a blank space instead of a plus sign (+). The default action is to prefix positive decimal values with a plus sign.

Table 8. Valid File Type Modifiers (Export) (continued)

Modifier	Description
decpt*x*	*x* is a single character substitute for the period as a decimal point character. The default value is a period (.). The specified character is used in place of a period as a decimal point character.[a]
dldel*x*	*x* is a single character DATALINK delimiter. The default value is a semicolon (;). The specified character is used in place of a semicolon as the inter-field separator for a DATALINK value. It is needed because a DATALINK value may have more than one sub-value. [a] **Note:** *x* must not be the same character specified as the row, column, or character string delimiter.
nodoubledel	Suppresses recognition of double character delimiters. For more information, see "Delimiter Restrictions" on page 312.
WSF File Format	
1	Creates a WSF file that is compatible with Lotus 1-2-3 Release 1, or Lotus 1-2-3 Release 1a.[c] This is the default.
2	Creates a WSF file that is compatible with Lotus Symphony Release 1.0.[c]
3	Creates a WSF file that is compatible with Lotus 1-2-3 Version 2, or Lotus Symphony Release 1.1.[c]
4	Creates a WSF file containing DBCS characters.

Notes:

1. The export utility does not issue a warning if an attempt is made to use unsupported file types with the MODIFIED BY option. If this is attempted, the export operation fails, and an error code is returned.
2. [a] "Delimiter Restrictions" on page 312 lists restrictions that apply to the characters that can be used as delimiter overrides.
3. [b] The export utility normally writes
   - date data in *YYYYMMDD* format
   - char(date) data in *"YYYY-MM-DD"* format
   - time data in *"HH.MM.SS"* format
   - time stamp data in *"YYYY-MM-DD-HH.MM.SS.uuuuuu"* format

   Data contained in any datetime columns specified in the SELECT statement for the export operation will also be in these formats.
4. [c] These files can also be directed to a specific product by specifying an `L` for Lotus 1-2-3, or an `S` for Symphony in the *filetype-mod* parameter string. Only one value or product designator may be specified.

Delimiter Restrictions

It is the user's responsibility to ensure that the chosen delimiter character is not part of the data to be moved. If it is, unexpected errors may occur. The following restrictions apply to column, string, DATALINK, and decimal point delimiters when moving data:

- Delimiters are mutually exclusive.
- A delimiter cannot be binary zero, a line-feed character, a carriage-return, or a blank space.
- The default decimal point (.) cannot be a string delimiter.
- The following characters are specified differently by an ASCII-family code page and an EBCDIC-family code page:
  - The Shift-In (0x0F) and the Shift-Out (0x0E) character cannot be delimiters for an EBCDIC MBCS data file.
  - Delimiters for MBCS, EUC, or DBCS code pages cannot be greater than 0x40, except the default decimal point for EBCDIC MBCS data, which is 0x4b.
  - Default delimiters for data files in ASCII code pages or EBCDIC MBCS code pages are:

    ```
    " (0x22, double quotation mark; string delimiter)
    , (0x2c, comma; column delimiter)
    ```

  - Default delimiters for data files in EBCDIC SBCS code pages are:

    ```
    " (0x7F, double quotation mark; string delimiter)
    , (0x6B, comma; column delimiter)
    ```

  - The default decimal point for ASCII data files is 0x2e (period).
  - The default decimal point for EBCDIC data files is 0x4B (period).
  - If the code page of the server is different from the code page of the client, it is recommended that the hex representation of non-default delimiters be specified. For example,

    ```
    db2 load from ... modified by chardel0x0C coldelX1e ...
    ```

The following information about support for double character delimiter recognition in DEL files applies to the export, import, and load utilities:

- Character delimiters are permitted within the character-based fields of a DEL file. This applies to fields of type CHAR, VARCHAR, LONG VARCHAR, or CLOB (except when `lobsinfile` is specified). Any pair of character delimiters found between the enclosing character delimiters is imported or loaded into the database. For example,

  ```
  "What a ""nice"" day!"
  ```

  will be imported as:

  ```
  What a "nice" day!
  ```

  In the case of export, the rule applies in reverse. For example,

```
I am 6" tall.
```

will be exported to a DEL file as:

```
"I am 6"" tall."
```

- In a DBCS environment, the pipe (|) character delimiter is not supported.

See Also

"sqluimpr - Import" on page 320

"sqluload - Load" on page 345.

sqlugrpn - Get Row Partitioning Number

Returns the partition number and the node number based on the partitioning key values. An application can use this information to determine at which node a specific row of a table is stored.

The partitioning data structure, "SQLUPI" on page 536, is the input for this API. The structure can be returned by "sqlugtpi - Get Table Partitioning Information" on page 318. Another input is the character representations of the corresponding partitioning key values. The output is a partition number generated by the partitioning strategy and the corresponding node number from the partitioning map. If the partitioning map information is not provided, only the partition number is returned. This can be useful when analyzing data distribution.

The database manager does not need to be running when this API is called.

Scope

This API can be invoked from any node in the `db2nodes.cfg` file.

Authorization

None

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Row Partitioning Number */
/* ... */
SQL_API_RC SQL_API_FN
  sqlugrpn (
    unsigned short num_ptrs,
    unsigned char ** ptr_array,
    unsigned short * ptr_lens,
    unsigned short ctrycode,
    unsigned short codepage,
    struct sqlupi * part_info,
    short * part_num,
    SQL_PDB_NODE_TYPE * node_num,
    unsigned short chklvl,
    struct sqlca * sqlca,
    short dataformat,
    void * pReserved1,
    void * pReserved2);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Row Partitioning Number */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggrpn (
    unsigned short num_ptrs,
    unsigned char ** ptr_array,
    unsigned short * ptr_lens,
    unsigned short ctrycode,
    unsigned short codepage,
    struct sqlupi * part_info,
    short * part_num,
    SQL_PDB_NODE_TYPE * node_num,
    unsigned short chklvl,
    struct sqlca * sqlca,
    short dataformat,
    void * pReserved1,
    void * pReserved2);
/* ... */
```

API Parameters

num_ptrs
The number of pointers in *ptr_array*. The value must be the same as the one specified for *part_info*; that is, *part_info->sqld*.

ptr_array
An array of pointers that points to the character representations of the corresponding values of each part of the partitioning key specified in *part_info*. If a null value is required, the corresponding pointer is set to null.

ptr_lens
An array of unsigned integers that contains the lengths of the character representations of the corresponding values of each part of the partitioning key specified in *part_info*.

ctrycode
The country code of the target database. For a list of valid country code values, see one of the *Quick Beginnings* books.

This value can also be obtained from the database configuration file (see the GET DATABASE CONFIGURATION command in the *Command Reference*.

codepage
The code page of the target database. For a list of valid code page values, see one of the *Quick Beginnings* books.

This value can also be obtained from the database configuration file (see the GET DATABASE CONFIGURATION command in the *Command Reference*.

part_info
A pointer to the *sqlupi* structure. For more information about this structure, see "SQLUPI" on page 536.

part_num
A pointer to a 2-byte signed integer that is used to store the partition number.

node_num
A pointer to an SQL_PDB_NODE_TYPE field used to store the node number. If the pointer is null, no node number is returned.

chklvl An unsigned integer that specifies the level of checking that is done on input parameters. If the value specified is zero, no checking is done. If any non-zero value is specified, all input parameters are checked.

sqlca Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

dataformat
Specifies the representation of partitioning key values. Valid values are:

SQL_CHARSTRING_FORMAT
All partitioning key values are represented by character strings. This is the default value.

SQL_IMPLIEDDECIMAL_FORMAT
The location of an implied decimal point is determined by the column definition. For example, if the column definition is DECIMAL(8,2), the value 12345 is processed as 123.45.

SQL_PACKEDDECIMAL_FORMAT
All decimal column partitioning key values are in packed decimal format.

SQL_BINARYNUMERICS_FORMAT
All numeric partitioning key values are in big-endian binary format.

pReserved1
Reserved for future use.

pReserved2
Reserved for future use.

Usage Notes

Data types supported on the operating system are the same as those that can be defined as a partitioning key.

CHAR, VARCHAR, GRAPHIC, and VARGRAPHIC must be converted to the target code page before this API is called.

For numeric and datetime data types, the character representations must be at the code page of the respective system where the API is invoked.

If *node_num* is not NULL, the partitioning map must be supplied; that is, `part_info->pmaplen` is either 2 or 8 192. Otherwise, SQLCODE -6038 is returned.

The partitioning key must be defined; that is, `part_info->sqld` must be greater than zero. Otherwise, SQLCODE -2032 is returned.

If a null value is assigned to a non-nullable partitioning column, SQLCODE -6039 is returned.

All the leading blanks and trailing blanks of the input character string are stripped, except for the CHAR, VARCHAR, GRAPHIC, and VARGRAPHIC data types, where only trailing blanks are stripped.

See Also

"sqlfxdb - Get Database Configuration" on page 275

"sqlugtpi - Get Table Partitioning Information" on page 318

"sqludrdt - Redistribute Nodegroup" on page 298.

sqlugtpi - Get Table Partitioning Information

Allows an application to obtain the partitioning information for a table. The partitioning information includes the partitioning map and the column definitions of the partitioning key. Information returned by this API can be passed to "sqlugrpn - Get Row Partitioning Number" on page 314 to determine the partition number and the node number for any row in the table.

To use this API, the application must be connected to the database that contains the table for which partitioning information is being requested.

Scope

This API can be executed on any node defined in the `db2nodes.cfg` file.

Authorization

For the table being referenced, a user must have at least one of the following:

- *sysadm* authority
- *dbadm* authority
- CONTROL privilege
- SELECT privilege

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Get Table Partitioning Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqlugtpi (
    unsigned char * tablename,
    struct sqlupi * part_info,
    struct sqlca * sqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Get Table Partitioning Information */
/* ... */
SQL_API_RC SQL_API_FN
  sqlggtpi (
    unsigned short tn_length,
    unsigned char * tablename,
    struct sqlupi * part_info,
    struct sqlca * sqlca);
/* ... */
```

API Parameters

tn_length
A 2-byte unsigned integer with the length of the table name.

tablename
The fully qualified name of the table.

part_info
A pointer to the *sqlupi* structure. For more information about this structure, see "SQLUPI" on page 536.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

See Also

"sqlugrpn - Get Row Partitioning Number" on page 314

"sqludrdt - Redistribute Nodegroup" on page 298.

sqluimpr - Import

Inserts data from an external file with a supported file format into a table, hierarchy, or view. A faster alternative is “sqluload - Load” on page 345; however, the load utility does not support loading data at the hierarchy level.

Authorization

- IMPORT using the INSERT option requires one of the following:
  - *sysadm*
  - *dbadm*
  - CONTROL privilege on each participating table or view
  - INSERT and SELECT privilege on each participating table or view.
- IMPORT to an existing table using the INSERT_UPDATE, REPLACE, or the REPLACE_CREATE option, requires one of the following:
  - *sysadm*
  - *dbadm*
  - CONTROL privilege on the table or view.
- IMPORT to a table or a hierarchy that does not exist using the CREATE, or the REPLACE_CREATE option, requires one of the following:
  - *sysadm*
  - *dbadm*
  - CREATETAB authority on the database, and one of:
    - IMPLICIT_SCHEMA authority on the database, if the schema name of the table does not exist
    - CREATEIN privilege on the schema, if the schema of the table exists.
    - CONTROL privilege on every sub-table in the hierarchy, if the REPLACE_CREATE option on the entire hierarchy is used.
- IMPORT to an existing hierarchy using the REPLACE option requires one of the following:
  - *sysadm*
  - *dbadm*
  - CONTROL privilege on every sub-table in the hierarchy.

Required Connection

Database. If implicit connect is enabled, a connection to the default database is established.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Import */
/* ... */
SQL_API_RC SQL_API_FN
  sqluimpr (
    char * pDataFileName,
    sqlu_media_list * pLobPathList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pMsgFileName,
    short CallerAction,
    struct sqluimpt_in*  pImportInfoIn,
    struct sqluimpt_out*  pImportInfoOut,
    sqlint32 * pNullIndicators,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Import */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgimpr (
    unsigned short DataFileNameLen,
    unsigned short FileTypeLen,
    unsigned short MsgFileNameLen,
    char * pDataFileName,
    sqlu_media_list * pLobPathList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pMsgFileName,
    short CallerAction,
    struct sqluimpt_in*  pImportInfoIn,
    struct sqluimpt_out*  pImportInfoOut,
    sqlint32 * NullIndicators,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

DataFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the input file name.

FileTypeLen
Input. A 2-byte unsigned integer representing the length in bytes of the input file type.

MsgFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the message file name.

pDataFileName
Input. A string containing the path and the name of the external input file from which the data is to be imported.

pLobPathList
Input. An *sqlu_media_list* using *media_type* `SQLU_LOCAL_MEDIA`, and the *sqlu_media_entry* structure listing paths on the client where the LOB files can be found.

For more information, see "SQLU-MEDIA-LIST" on page 518.

pDataDescriptor
Input. Pointer to an *sqldcol* structure containing information about the columns being selected for import from the external file. The value of the *dcolmeth* field determines how the remainder of the information provided in this parameter is interpreted by the import utility. Valid values for this parameter (defined in `sqlutil`) are:

SQL_METH_N
Names. Selection of columns from the external input file is by column name.

SQL_METH_P
Positions. Selection of columns from the external input file is by column position.

SQL_METH_L
Locations. Selection of columns from the external input file is by column location. The database manager rejects an import call with a location pair that is invalid because of any one of the following conditions:

- Either the beginning or the ending location is not in the range from 1 to the largest signed 2-byte integer.
- The ending location is smaller than the beginning location.

- The input column width defined by the location pair is not compatible with the type and the length of the target column.

A location pair with both locations equal to zero indicates that a nullable column is to be filled with NULLs.

SQL_METH_D
Default. If *pDataDescriptor* is NULL, or is set to SQL_METH_D, default selection of columns from the external input file is done. In this case, the number of columns and the column specification array are both ignored. The first *n* columns of data in the external input file are taken in their natural order, where *n* is the number of database columns into which the data is to be imported.

For more information, see "SQLDCOL" on page 456.

pActionString
Input. Pointer to an *sqlchar* structure containing a 2-byte long field, followed by an array of characters identifying the columns into which data is to be imported.

The character array is of the form:

```
{INSERT | INSERT_UPDATE | REPLACE | CREATE | REPLACE_CREATE}
INTO {tname[(tcolumn-list)] |
[{ALL TABLES | (tname[(tcolumn-list)][, tname[(tcolumn-list)]])}]
[IN] HIERARCHY {STARTING tname | (tname[, tname])}
[UNDER sub-table-name | AS ROOT TABLE]}
[DATALINK SPECIFICATION datalink-spec]
```

INSERT
Adds the imported data to the table without changing the existing table data.

INSERT_UPDATE
Adds the imported rows if their primary key values are not in the table, and uses them for update if their primary key values are found. This option is only valid if the target table has a primary key, and the specified (or implied) list of target columns being imported includes all columns for the primary key. This option cannot be applied to views.

REPLACE
Deletes all existing data from the table by truncating the table object, and inserts the imported data. The table definition and the index definitions are not changed. (Indexes are deleted and replaced if indexixf is in *FileTypeMod*, and *FileType* is SQL_IXF.) If the table is not already defined, an error is returned.

Attention: If an error occurs after the existing data is deleted, that data is lost.

CREATE
Creates the table definition and the row contents using the information in the specified PC/IXF file, if the specified table is not defined. If the file was previously exported by DB2, indexes are also created. If the specified table is already defined, an error is returned. This option is valid for the PC/IXF file format only.

REPLACE_CREATE
Replaces the table contents using the PC/IXF row information in the PC/IXF file, if the specified table is defined. If the table is not already defined, the table definition and row contents are created using the information in the specified PC/IXF file. If the PC/IXF file was previously exported by DB2, indexes are also created. This option is valid for the PC/IXF file format only.

Attention: If an error occurs after the existing data is deleted, that data is lost.

tname The name of the table, typed table, view, or object view into which the data is to be inserted. An alias for REPLACE, INSERT_UPDATE, or INSERT can be specified, except in the case of a down-level server, when a qualified or unqualified name should be specified. If it is a view, it cannot be a read-only view.

tcolumn-list
A list of table or view column names into which the data is to be inserted. The column names must be separated by commas. If column names are not specified, column names as defined in the CREATE TABLE or the ALTER TABLE statement are used. If no column list is specified for typed tables, data is inserted into all columns within each sub-table.

sub-table-name
Specifies a parent table when creating one or more sub-tables under the CREATE option.

ALL TABLES
An implicit keyword for hierarchy only. When importing a hierarchy, the default is to import all tables specified in the *traversal-order-list*.

HIERARCHY
Specifies that hierarchical data is to be imported.

STARTING
Keyword for hierarchy only. Specifies that the default order, starting from a given sub-table name, is to be used.

UNDER
Keyword for hierarchy and CREATE only. Specifies that the new hierarchy, sub-hierarchy, or sub-table is to be created under a given sub-table.

AS ROOT TABLE
Keyword for hierarchy and CREATE only. Specifies that the new hierarchy, sub-hierarchy, or sub-table is to be created as a stand-alone hierarchy.

DATALINK SPECIFICATION *datalink-spec*
Specifies parameters pertaining to DB2 Data Links. These parameters can be specified using the same syntax as in the IMPORT command (see the *Command Reference*).

The *tname* and the *tcolumn-list* parameters correspond to the *tablename* and the *colname* lists of SQL INSERT statements, and have the same restrictions.

The columns in *tcolumn-list* and the external columns (either specified or implied) are matched according to their position in the list or the structure (data from the first column specified in the *sqldcol* structure is inserted into the table or view field corresponding to the first element of the *tcolumn-list*).

If unequal numbers of columns are specified, the number of columns actually processed is the lesser of the two numbers. This could result in an error (because there are no values to place in some non-nullable table fields) or an informational message (because some external file columns are ignored).

For more information, see "SQLCHAR" on page 452.

pFileType
Input. A string that indicates the format of the data within the external file. Supported external file formats (defined in `sqlutil`) are:

SQL_ASC
Non-delimited ASCII.

SQL_DEL
Delimited ASCII, for exchange with dBase, BASIC, and the IBM Personal Decision Series programs, and many other database managers and file managers.

SQL_IXF
PC version of the Integrated Exchange Format, the preferred method for exporting data from a table so that it can be imported later into the same table or into another database manager table.

SQL_WSF
Worksheet formats for exchange with Lotus Symphony and 1-2-3 programs.

For more information about file formats, see the "Export/Import/Load Utility File Formats" appendix in the *Data Movement Utilities Guide and Reference*.

pFileTypeMod
Input. A pointer to a structure containing a 2-byte long field, followed by an array of characters that specify one or more processing options. If this pointer is NULL, or the structure pointed to has zero characters, this action is interpreted as selection of a default specification.

Not all options can be used with all of the supported file types.

For more information, see "SQLCHAR" on page 452, and the *Command Reference*.

pMsgFileName
Input. A string containing the destination for error, warning, and informational messages returned by the utility. It can be the path and the name of an operating system file or a standard device. If the file already exists, it is appended to. If it does not exist, a file is created.

CallerAction
Input. An action requested by the caller. Valid values (defined in `sqlutil`) are:

SQLU_INITIAL
Initial call. This value must be used on the first call to the API.

If the initial call or any subsequent call returns and requires the calling application to perform some action prior to completing the requested import operation, the caller action must be set to one of the following:

SQLU_CONTINUE
Continue processing. This value can only be used on subsequent calls to the API, after the initial call has returned with the utility requesting user input (for example, to respond to an end of tape condition). It specifies that the user action

requested by the utility has completed, and the utility can continue processing the initial request.

SQLU_TERMINATE
Terminate processing. This value can only be used on subsequent calls to the API, after the initial call has returned with the utility requesting user input (for example, to respond to an end of tape condition). It specifies that the user action requested by the utility was not performed, and the utility is to terminate processing the initial request.

pImportInfoIn
Input. Optional pointer to the *sqluimpt_in* structure containing additional input parameters. For information about this structure, see "SQLUIMPT-IN" on page 526.

pImportInfoOut
Output. Optional pointer to the *sqluimpt_out* structure containing additional output parameters. For information about this structure, see "SQLUIMPT-OUT" on page 527.

NullIndicators
Input. For ASC files only. An array of integers that indicate whether or not the column data is nullable. The number of elements in this array must match the number of columns in the input file; there is a one-to-one ordered correspondence between the elements of this array and the columns being imported from the data file. Therefore, the number of elements must equal the *dcolnum* field of the *pDataDescriptor* parameter. Each element of the array contains a number identifying a column in the data file that is to be used as a null indicator field, or a zero indicating that the table column is not nullable. If the element is not zero, the identified column in the data file must contain a `Y` or an `N`. A `Y` indicates that the table column data is NULL, and `N` indicates that the table column data is not NULL.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
IMPORT FROM datafile OF filetype
[MODIFIED BY :filetmod]
[METHOD {L|N|P} USING :dcoldata]
[COMMITCOUNT :commitcnt] [RESTARTCOUNT :restartcnt]
MESSAGES msgfile
{INSERT|REPLACE|CREATE|INSERT_UPDATE|REPLACE_CREATE}
INTO tname [(:columns)]
[OUTPUT INTO :output]

CONTINUE IMPORT

STOP IMPORT
```

REXX API Parameters

datafile
Name of the file from which the data is to be imported.

filetype
The format of the data in the external import file. The supported file formats are:

DEL Delimited ASCII

ASC Non-delimited ASCII

WSF Worksheet format

IXF PC version of Integrated Exchange Format.

filetmod
A host variable containing additional processing options (see the *Command Reference*).

L | N | P
A character specifying the method to be used to select columns within the external input file. Valid values are:

L Location

N Name

P Position.

dcoldata
A compound REXX host variable containing information about the columns selected for import from the external input file. The content of the structure depends upon the specified *method*. In the following, XXX represents the name of the host variable:

- Location method

  XXX.0 Number of elements in the remainder of the variable

XXX.1 A number representing the starting location of this column in the input file. This column becomes the first column in the database table.

XXX.2 A number representing the ending location of the column.

XXX.3 A number representing the starting location of this column in the input file. This column becomes the second column in the database table.

XXX.4 A number representing the ending location of the column.

XXX.5 and so on.

- Name method

  XXX.0 Number of column names contained in the host variable.

  XXX.1 First name.

  XXX.2 Second name.

  XXX.3 and so on.

- Position method

  XXX.0 Number of column positions contained in the host variable.

  XXX.1 A column position in the external input file.

  XXX.2 A column position in the external input file.

  XXX.3 and so on.

tname Name of the target table or view. Data cannot be imported to a read-only view.

columns
A REXX host variable containing the names of the columns in the table or the view into which the data is to be inserted. In the following, XXX represents the name of the host variable:

XXX.0 Number of columns.

XXX.1 First column name.

XXX.2 Second column name.

XXX.3 and so on.

msgfile
File, path, or device name where error and warning messages are to be sent.

commitcnt
Performs a COMMIT after every *commitcnt* records are imported.

restartcnt
Specifies that an import operation is to be started at record *restartcnt* + 1. The first *restartcnt* records are skipped.

output
A compound REXX host variable into which information from the import operation is passed. In the following, XXX represents the name of the host variable:

XXX.1 Number of records read from the external input file during the import operation.

XXX.2 Number of records skipped before inserting or updating begins.

XXX.3 Number of rows inserted into the target table.

XXX.4 Number of rows in the target table updated with information from the imported records.

XXX.5 Number of records that could not be imported.

XXX.6 Number of records imported successfully and committed to the database, including rows inserted, updated, skipped, and rejected.

Sample Programs

C	\sqllib\samples\c\impexp.sqc
COBOL	\sqllib\samples\cobol\impexp.sqb
REXX	\sqllib\samples\rexx\impexp.cmd

Usage Notes

Be sure to complete all table operations and release all locks before starting an import operation. This can be done by issuing a COMMIT after closing all cursors opened WITH HOLD, or by issuing a ROLLBACK.

The import utility adds rows to the target table using the SQL INSERT statement. The utility issues one INSERT statement for each row of data in the input file. If an INSERT statement fails, one of two actions result:

- If it is likely that subsequent INSERT statements can be successful, a warning message is written to the message file, and processing continues.
- If it is likely that subsequent INSERT statements will fail, and there is potential for database damage, an error message is written to the message file, and processing halts.

The utility performs an automatic COMMIT after the old rows are deleted during a REPLACE or a REPLACE_CREATE operation. Therefore, if the system fails, or the application interrupts the database manager after the table

object is truncated, all of the old data is lost. Ensure that the old data is no longer needed before using these options.

If the log becomes full during a CREATE, REPLACE, or REPLACE_CREATE operation, the utility performs an automatic COMMIT on inserted records. If the system fails, or the application interrupts the database manager after an automatic COMMIT, a table with partial data remains in the database. Use the REPLACE or the REPLACE_CREATE option to rerun the whole import operation, or use INSERT with the *restartcnt* parameter set to the number of rows successfully imported.

By default, automatic COMMITs are not performed for the INSERT or the INSERT_UPDATE option. They are, however, performed if the *commitcnt* parameter is not zero. A full log results in a ROLLBACK.

Whenever the import utility performs a COMMIT, two messages are written to the message file: one indicates the number of records to be committed, and the other is written after a successful COMMIT. When restarting the import operation after a failure, specify the number of records to skip, as determined from the last successful COMMIT.

The import utility accepts input data with minor incompatibility problems (for example, character data can be imported using padding or truncation, and numeric data can be imported with a different numeric data type), but data with major incompatibility problems is not accepted.

One cannot REPLACE or REPLACE_CREATE an object table if it has any dependents other than itself, or an object view if its base table has any dependents (including itself). To replace such a table or a view, do the following:

1. Drop all foreign keys in which the table is a parent.
2. Run the import utility.
3. Alter the table to recreate the foreign keys.

If an error occurs while recreating the foreign keys, modify the data to maintain referential integrity.

Referential constraints and foreign key definitions are not preserved when creating tables from PC/IXF files. (Primary key definitions *are* preserved if the data was previously exported using `SELECT *`.)

Importing to a remote database requires enough disk space on the server for a copy of the input data file, the output message file, and potential growth in the size of the database.

If an import operation is run against a remote database, and the output message file is very long (more than 60KB), the message file returned to the user on the client may be missing messages from the middle of the import operation. The first 30KB of message information and the last 30KB of message information are always retained.

Importing PC/IXF files to a remote database is much faster if the PC/IXF file is on a hard drive rather than on diskettes. Non-default values for *pDataDescriptor*, or specifying an explicit list of table columns in *pActionString*, makes importing to a remote database slower.

The database table or hierarchy must exist before data in the ASC, DEL, or WSF file formats can be imported; however, if the table does not already exist, IMPORT CREATE or IMPORT REPLACE_CREATE creates the table when it imports data from a PC/IXF file. For typed tables, IMPORT CREATE can create the type hierarchy and the table hierarchy as well.

PC/IXF import should be used to move data (including hierarchical data) between databases. If character data containing row separators is exported to a delimited ASCII (DEL) file and processed by a text transfer program (moving, for example between OS/2 and AIX systems), fields containing the row separators will shrink or expand. PC/IXF file format specifications permit migration of data between OS/2 (IBM Extended Services for OS/2, OS/2 Extended Edition, and DB2 for OS/2) databases and DB2 for AIX databases via export, binary copying of files between OS/2 and AIX, and import. The file copying step is not necessary if the source and the target databases are both accessible from the same client.

The data in ASC and DEL files is assumed to be in the code page of the client application performing the import. PC/IXF files, which allow for different code pages, are recommended when importing data in different code pages. If the PC/IXF file and the import utility are in the same code page, processing occurs as for a regular application. If the two differ, and the FORCEIN option is specified, the import utility assumes that data in the PC/IXF file has the same code page as the application performing the import. This occurs even if there is a conversion table for the two code pages. If the two differ, the FORCEIN option is not specified, and there is a conversion table, all data in the PC/IXF file will be converted from the file code page to the application code page. If the two differ, the FORCEIN option is not specified, and there is no conversion table, the import operation will fail. This applies only to PC/IXF files on DB2 for AIX clients.

For table objects on an 8KB page that are close to the limit of 1012 columns, import of PC/IXF data files may cause DB2 to return an error, because the maximum size of an SQL statement was exceeded. This situation can occur

only if the columns are of type CHAR, VARCHAR, or CLOB. The restriction does not apply to import of DEL or ASC files.

DB2 Connect can be used to import data to DRDA servers such as DB2 for OS/390, DB2 for VM and VSE, and DB2 for OS/400. Only PC/IXF import (INSERT option) is supported. The *restartcnt* parameter, but not the *commitcnt* parameter, is also supported.

When using the CREATE option with typed tables, create every sub-table defined in the PC/IXF file; sub-table definitions cannot be altered. When using options other than CREATE with typed tables, the traversal order list enables one to specify the traverse order; therefore, the traversal order list must match the one used during the export operation. For the PC/IXF file format, one need only specify the target sub-table name, and use the traverse order stored in the file.

The import utility can be used to recover a table previously exported to a PC/IXF file. The table returns to the state it was in when exported.

Data cannot be imported to a system table, a declared temporary table, or a summary table.

Views cannot be created through the import utility.

Importing a multiple-part PC/IXF file whose individual parts are copied from an OS/2 system to an AIX system is supported on DB2.

On the Windows NT operating system:

- Importing logically split PC/IXF files is not supported.
- Importing bad format PC/IXF or WSF files is not supported.

DB2 Data Links Manager Considerations

Before running the DB2 import utility, do the following:

1. Copy the files that will be referenced to the appropriate Data Links servers. The **dlfm_import** utility can be used to extract files from an archive that is generated by the **dlfm_export** utility.
2. Register the required prefix names to the DB2 Data Links Managers. There may be other administrative tasks, such as registering the database, if required.
3. Update the Data Links server information in the URLs (of the DATALINK columns) from the exported data for the SQL table, if required. (If the original configuration's Data Links servers are the same at the target location, the Data Links server names need not be updated.)

4. Define the Data Links servers at the target configuration in the DB2 Data Links Manager configuration file.

When the import utility is executed on the target system, data related to DATALINK columns is loaded into the underlying DB2 tables using SQL INSERT (as is the case for other columns).

During the insert operation, DATALINK column processing links the files in the appropriate Data Links servers according to the column specifications at the target database.

Representation of DATALINK Information in an Input File

For a description of how DATALINK information is represented in an input file, see page 355.

Table 9. Valid File Type Modifiers (Import)

Modifier	Description
All File Formats	
compound=*x*	*x* is a number between 1 and 100 inclusive. Uses nonatomic compound SQL to insert the data, and *x* statements will be attempted each time. If this modifier is specified, and the transaction log is not sufficiently large, the import operation will fail. The transaction log must be large enough to accommodate either the number of rows specified by COMMITCOUNT, or the number of rows in the data file if COMMITCOUNT is not specified. It is therefore recommended that the COMMITCOUNT option be specified to avoid transaction log overflow. This modifier is incompatible with INSERT_UPDATE mode, hierarchical tables, and the following modifiers: `usedefaults`, `identitymissing`, `identityignore`, `generatedmissing`, and `generatedignore`.
generatedignore	This modifier informs the import utility that data for all generated columns is present in the data file but should be ignored. This results in all values for the generated columns being generated by the utility. This modifier cannot be used with the `generatedmissing` modifier.
generatedmissing	If this modifier is specified, the utility assumes that the input data file contains no data for the generated columns (not even NULLs), and will therefore generate a value for each row. This modifier cannot be used with the `generatedignore` modifier.

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description
identityignore	This modifier informs the import utility that data for the identity column is present in the data file but should be ignored. This results in all identity values being generated by the utility. The behavior will be the same for both GENERATED ALWAYS and GENERATED BY DEFAULT identity columns. This means that for GENERATED ALWAYS columns, no rows will be rejected. This modifier cannot be used with the `identitymissing` modifier.
identitymissing	If this modifier is specified, the utility assumes that the input data file contains no data for the identity column (not even NULLs), and will therefore generate a value for each row. The behavior will be the same for both GENERATED ALWAYS and GENERATED BY DEFAULT identity columns. This modifier cannot be used with the `identityignore` modifier.
lobsinfile	*lob-path* specifies the path to the files containing LOB values.
no_type_id	Valid only when importing into a single sub-table. Typical usage is to export data from a regular table, and then to invoke an import operation (using this modifier) to convert the data into a single sub-table.
nodefaults	If a source column for a target table column is not explicitly specified, and the table column is not nullable, default values are not loaded. Without this option, if a source column for one of the target table columns is not explicitly specified, one of the following occurs: • If a default value can be specified for a column, the default value is loaded • If the column is nullable, and a default value cannot be specified for that column, a NULL is loaded • If the column is not nullable, and a default value cannot be specified, an error is returned, and the utility stops processing.

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description
usedefaults	If a source column for a target table column has been specified, but it contains no data for one or more row instances, default values are loaded. Examples of missing data are: • For DEL files: ",," is specified for the column • For ASC files: The NULL indicator is set to yes for the column • For DEL/ASC/WSF files: A row that does not have enough columns, or is not long enough for the original specification. Without this option, if a source column contains no data for a row instance, one of the following occurs: • If the column is nullable, a NULL is loaded • If the column is not nullable, the utility rejects the row.
ASCII File Formats (ASC/DEL)	

dateformat="*x*"	*x* is the format of the date in the source file.[a] Valid date elements are:
	`YYYY - Year (four digits ranging from 0000 - 9999)`
	`M - Month (one or two digits ranging from 1 - 12)`
	`MM - Month (two digits ranging from 1 - 12; mutually exclusive with M)`
	`D - Day (one or two digits ranging from 1 - 31)`
	`DD - Day (two digits ranging from 1 - 31; mutually exclusive with D)`
	`DDD - Day of the year (three digits ranging from 001 - 366; mutually exclusive with other day or month elements)`
	A default value of 1 is assigned for each element that is not specified. Some examples of date formats are:
	`"D-M-YYYY"`
	`"MM.DD.YYYY"`
	`"YYYYDDD"`

implieddecimal	The location of an implied decimal point is determined by the column definition; it is no longer assumed to be at the end of the value. For example, the value `12345` is loaded into a DECIMAL(8,2) column as `123.45`, *not* `12345.00`.
noeofchar	The optional end-of-file character `x'1A'` is not recognized as the end of file. Processing continues as if it were a normal character.

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description

timeformat="*x*"	*x* is the format of the time in the source file.[a] Valid time elements are:
	`H - Hour (one or two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system)`
	`HH - Hour (two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system; mutually exclusive with H)`
	`M - Minute (one or two digits ranging from 0 - 59)`
	`MM - Minute (two digits ranging from 0 - 59; mutually exclusive with M)`
	`S - Second (one or two digits ranging from 0 - 59)`
	`SS - Second (two digits ranging from 0 - 59; mutually exclusive with S)`
	`SSSSS - Second of the day after midnight (5 digits ranging from 00000 - 86399; mutually exclusive with other time elements)`
	`TT - Meridian indicator (AM or PM)`
	A default value of 0 is assigned for each element that is not specified. Some examples of time formats are:
	`"HH:MM:SS"`
	`"HH.MM TT"`
	`"SSSSS"`

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description

timestampformat="*x*"	*x* is the format of the time stamp in the source file.[a] Valid time stamp elements are:
	`YYYY - Year (four digits ranging from 0000 - 9999)`
	`M - Month (one or two digits ranging from 1 - 12)`
	`MM - Month (two digits ranging from 1 - 12; mutually exclusive with M, month)`
	`D - Day (one or two digits ranging from 1 - 31)`
	`DD - Day (two digits ranging from 1 - 31; mutually exclusive with D)`
	`DDD - Day of the year (three digits ranging from 001 - 366; mutually exclusive with other day or month elements)`
	`H - Hour (one or two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system)`
	`HH - Hour (two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system; mutually exclusive with H)`
	`M - Minute (one or two digits ranging from 0 - 59)`
	`MM - Minute (two digits ranging from 0 - 59; mutually exclusive with M, minute)`
	`S - Second (one or two digits ranging from 0 - 59)`
	`SS - Second (two digits ranging from 0 - 59; mutually exclusive with S)`
	`SSSSS - Second of the day after midnight (5 digits ranging from 00000 - 86399; mutually exclusive with other time elements)`
	`UUUUUU - Microsecond (6 digits ranging from 000000 - 999999)`
	`TT - Meridian indicator (AM or PM)`
	A default value of 1 is assigned for unspecified YYYY, M, MM, D, DD, or DDD elements. A default value of 0 is assigned for all other unspecified elements. Following is an example of a time stamp format:
	`"YYYY/MM/DD HH:MM:SS.UUUUUU"`
	The following example illustrates how to import data containing user defined date and time formats into a table called schedule:
	`db2 import from delfile2 of del modified by timestampformat="yyyy.mm.dd hh:mm tt" insert into schedule`

ASC (Non-delimited ASCII) File Format	

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description
nochecklengths	If `nochecklengths` is specified, an attempt is made to import each row, even if the source data has a column definition that exceeds the size of the target table column. Such rows can be successfully imported if code page conversion causes the source data to shrink; for example, 4-byte EUC data in the source could shrink to 2-byte DBCS data in the target, and require half the space. This option is particularly useful if it is known that the source data will fit in all cases despite mismatched column definitions.
nullindchar=*x*	*x* is a single character. Changes the character denoting a null value to *x*. The default value of *x* is `Y`.[b] This modifier is case sensitive for EBCDIC data files, except when the character is an English letter. For example, if the null indicator character is specified to be the letter `N`, then `n` is also recognized as a null indicator.
reclen=*x*	*x* is an integer with a maximum value of 32 767. *x* characters are read for each row, and a new-line character is not used to indicate the end of the row.

striptblanks	Truncates any trailing blank spaces when loading data into a variable-length field. If this option is not specified, blank spaces are kept.
	
	In the following example, `striptblanks` causes the import utility to truncate trailing blank spaces:
	`db2 import from myfile.asc of asc`
	`modified by striptblanks`
	`method l (1 10, 12 15) messages msgs.txt`
	`insert into staff`
	
	This option cannot be specified together with `striptnulls`. These are mutually exclusive options.
	Note: This option replaces the obsolete `t` option, which is supported for back-level compatibility only.

striptnulls	Truncates any trailing NULLs (0x00 characters) when loading data into a variable-length field. If this option is not specified, NULLs are kept. This option cannot be specified together with `striptblanks`. These are mutually exclusive options. **Note:** This option replaces the obsolete `padwithzero` option, which is supported for back-level compatibility only.
DEL (Delimited ASCII) File Format	

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description
chardel*x*	*x* is a single character string delimiter. The default value is a double quotation mark ("). The specified character is used in place of double quotation marks to enclose a character string.[bc] The single quotation mark (') can also be specified as a character string delimiter. In the following example, `chardel''` causes the import utility to interpret any single quotation mark (') it encounters as a character string delimiter: `db2 "import from myfile.del of del modified by chardel'' method p (1, 4) insert into staff (id, years)"`
coldel*x*	*x* is a single character column delimiter. The default value is a comma (,). The specified character is used in place of a comma to signal the end of a column.[bc] In the following example, `coldel;` causes the import utility to interpret any semicolon (;) it encounters as a column delimiter: `db2 import from myfile.del of del modified by coldel; messages msgs.txt insert into staff`
datesiso	Date format. Causes all date data values to be imported in ISO format.
decplusblank	Plus sign character. Causes positive decimal values to be prefixed with a blank space instead of a plus sign (+). The default action is to prefix positive decimal values with a plus sign.
decpt*x*	*x* is a single character substitute for the period as a decimal point character. The default value is a period (.). The specified character is used in place of a period as a decimal point character.[bc] In the following example, `decpt;` causes the import utility to interpret any semicolon (;) it encounters as a decimal point: `db2 "import from myfile.del of del modified by chardel' decpt; messages msgs.txt insert into staff"`

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description

delprioritychar	The current default priority for delimiters is: record delimiter, character delimiter, column delimiter. This modifier protects existing applications that depend on the older priority by reverting the delimiter priorities to: character delimiter, record delimiter, column delimiter. Syntax:
	`db2 import ... modified by delprioritychar ...`
	For example, given the following DEL data file:
	`"Smith, Joshua",4000,34.98<row delimiter>`
	`"Vincent,<row delimiter>, is a manager", ...`
	`... 4005,44.37<row delimiter>`
	With the `delprioritychar` modifier specified, there will be only two rows in this data file. The second <row delimiter> will be interpreted as part of the first data column of the second row, while the first and the third <row delimiter> are interpreted as actual record delimiters. If this modifier is *not* specified, there will be three rows in this data file, each delimited by a <row delimiter>.

dldel*x*	*x* is a single character DATALINK delimiter. The default value is a semicolon (;). The specified character is used in place of a semicolon as the inter-field separator for a DATALINK value. It is needed because a DATALINK value may have more than one sub-value. [bc] **Note:** *x* must not be the same character specified as the row, column, or character string delimiter.
keepblanks	Preserves the leading and trailing blanks in each field of type CHAR, VARCHAR, LONG VARCHAR, or CLOB. Without this option, all leading and trailing blanks that are not inside character delimiters are removed, and a NULL is inserted into the table for all blank fields.
nodoubledel	Suppresses recognition of double character delimiters. For more information, see "Delimiter Restrictions" on page 312.
IXF File Format	
forcein	Directs the utility to accept data despite code page mismatches, and to suppress translation between code pages. Fixed length target fields are checked to verify that they are large enough for the data. If `nochecklengths` is specified, no checking is done, and an attempt is made to import each row.

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description
indexixf	Directs the utility to drop all indexes currently defined on the existing table, and to create new ones from the index definitions in the PC/IXF file. This option can only be used when the contents of a table are being replaced. It cannot be used with a view, or when a *insert-column* is specified.
indexschema=*schema*	Uses the specified *schema* for the index name during index creation. If *schema* is not specified (but the keyword `indexschema` *is* specified), uses the connection user ID. If the keyword is not specified, uses the schema in the IXF file.
nochecklengths	If `nochecklengths` is specified, an attempt is made to import each row, even if the source data has a column definition that exceeds the size of the target table column. Such rows can be successfully imported if code page conversion causes the source data to shrink; for example, 4-byte EUC data in the source could shrink to 2-byte DBCS data in the target, and require half the space. This option is particularly useful if it is known that the source data will fit in all cases despite mismatched column definitions.

Table 9. Valid File Type Modifiers (Import) (continued)

Modifier	Description

Notes:

1. The import utility does not issue a warning if an attempt is made to use unsupported file types with the MODIFIED BY option. If this is attempted, the import operation fails, and an error code is returned.
2. [a] Double quotation marks around the date format string are mandatory. Field separators cannot contain any of the following: a-z, A-Z, and 0-9. The field separator should not be the same as the character delimiter or field delimiter in the DEL file format. A field separator is optional if the start and end positions of an element are unambiguous. Ambiguity can exist if (depending on the modifier) elements such as D, H, M, or S are used, because of the variable length of the entries.

   For time stamp formats, care must be taken to avoid ambiguity between the month and the minute descriptors, since they both use the letter M. A month field must be adjacent to other date fields. A minute field must be adjacent to other time fields. Following are some ambiguous time stamp formats:

   ```
   "M" (could be a month, or a minute)
   "M:M" (Which is which?)
   "M:YYYY:M" (Both are interpreted as month.)
   "S:M:YYYY" (adjacent to both a time value and a date value)
   ```

   In ambiguous cases, the utility will report an error message, and the operation will fail.

   Following are some unambiguous time stamp formats:

   ```
   "M:YYYY" (Month)
   "S:M" (Minute)
   "M:YYYY:S:M" (Month....Minute)
   "M:H:YYYY:M:D" (Minute....Month)
   ```

   Note: Some characters, such as double quotation marks and back slashes, must be preceded by an escape character (for example, \).
3. [b] The character must be specified in the code page of the source data.

   The character code point (instead of the character symbol), can be specified using the syntax xJJ or 0xJJ, where JJ is the hexadecimal representation of the code point. For example, to specify the # character as a column delimiter, use one of the following:

   ```
   ... modified by coldel# ...
   ... modified by coldel0x23 ...
   ... modified by coldelX23 ...
   ```
4. [c] "Delimiter Restrictions" on page 312 lists restrictions that apply to the characters that can be used as delimiter overrides.

See Also

"sqluexpr - Export" on page 302

"sqluload - Load" on page 345.

sqluload - Load

Loads data into a DB2 table. Data residing on the server may be in the form of a file, tape, or named pipe. Data residing on a remotely connected client may be in the form of a fully qualified file or named pipe. Tape is not supported on OS/2. The load utility does not support loading data at the hierarchy level.

Scope

This command affects only the partition to which a direct connection exists; the load utility operates on a single database partition only.

Loading data that resides on a remotely connected client is not supported under the following conditions:

- The database that the client is connected to is in a DB2 Enterprise - Extended Edition environment.
- The database that the client is connected to is cataloged against an already cataloged database.

Authorization

One of the following:

- *sysadm*
- *dbadm*
- load authority on the database and
  - INSERT privilege on the table when the load utility is invoked in INSERT mode, TERMINATE mode (to terminate a previous load insert operation), or RESTART mode (to restart a previous load insert operation)
  - INSERT and DELETE privilege on the table when the load utility is invoked in REPLACE mode, TERMINATE mode (to terminate a previous load replace operation), or RESTART mode (to restart a previous load replace operation)
  - INSERT privilege on the exception table, if such a table is used as part of the load operation.

Note: Since all load processes (and all DB2 server processes, in general), are owned by the instance owner, and all of these processes use the identification of the instance owner to access needed files, the instance owner must have read access to input data files. These input data files must be readable by the instance owner, regardless of who invokes the command.

Required Connection

Database. If implicit connect is enabled, a connection to the default database is established.

Instance. An explicit attachment is not required. If a connection to the database has been established, an implicit attachment to the local instance is attempted.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Load */
/* ... */
SQL_API_RC SQL_API_FN
  sqluload (
    sqlu_media_list * pDataFileList,
    sqlu_media_list * pLobPathList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pLocalMsgFileName,
    char * pRemoteMsgFileName,
    short CallerAction,
    struct sqluload_in * pLoadInfoIn,
    struct sqluload_out * pLoadInfoOut,
    sqlu_media_list * pWorkDirectoryList,
    sqlu_media_list * pCopyTargetList,
    sqlint32 * pNullIndicators,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Load */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgload (
    unsigned short FileTypeLen,
    unsigned short LocalMsgFileNameLen,
    unsigned short RemoteMsgFileNameLen,
    sqlu_media_list * pDataFileList,
    sqlu_media_list * pLobPathList,
    struct sqldcol * pDataDescriptor,
    struct sqlchar * pActionString,
    char * pFileType,
    struct sqlchar * pFileTypeMod,
    char * pLocalMsgFileName,
    char * pRemoteMsgFileName,
    short CallerAction,
    struct sqluload_in * pLoadInfoIn,
    struct sqluload_out * pLoadInfoOut,
    sqlu_media_list * pWorkDirectoryList,
    sqlu_media_list * pCopyTargetList,
    sqlint32 * pNullIndicators,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

FileTypeLen
Input. A 2-byte unsigned integer representing the length in bytes of the file type.

LocalMsgFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the local message file name.

RemoteMsgFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the temporary files path name.

pDataFileList
Input. A pointer to an *sqlu_media_list* structure used to provide a list of source files, devices, vendors or pipes. Tape is not supported on OS/2.

The information provided in this structure depends on the value of the *media_type* field. Valid values (defined in `sqlutil`) are:

SQLU_SERVER_LOCATION
If the *media_type* field is set to this value, the caller provides information through *sqlu_location_entry* structures. The *sessions*

field indicates the number of *sqlu_location_entry* structures provided. This is used for files, devices, and named pipes.

SQLU_CLIENT_LOCATION
If the *media_type* field is set to this value, the caller provides information through *sqlu_location_entry* structures. The sessions field indicates the number of *sqlu_location_entry* structures provided. This is used for fully qualified files and named pipes. Note that this *media_type* is only valid if the API is being called via a remotely connected client.

SQLU_TSM_MEDIA
If the *media_type* field is set to this value, the *sqlu_vendor* structure is used, where *filename* is the unique identifier for the data to be loaded. There should only be one *sqlu_vendor* entry, regardless of the value of *sessions*. The *sessions* field indicates the number of TSM sessions to initiate. The load utility will start the sessions with different sequence numbers, but with the same data in the one *sqlu_vendor* entry.

SQLU_OTHER_MEDIA
If the *media_type* field is set to this value, the *sqlu_vendor* structure is used, where *shr_lib* is the shared library name, and *filename* is the unique identifier for the data to be loaded. There should only be one *sqlu_vendor* entry, regardless of the value of *sessions*. The *sessions* field indicates the number of other vendor sessions to initiate. The load utility will start the sessions with different sequence numbers, but with the same data in the one *sqlu_vendor* entry.

Wherever a file name is provided, it should be fully qualified. For more information, see "SQLU-MEDIA-LIST" on page 518.

pLobPathList
Input. A pointer to an *sqlu_media_list* structure. For IXF, ASC, and DEL file types, a list of fully qualified paths or devices to identify the location of the individual LOB files to be loaded. The file names are found in the IXF, ASC, or DEL files, and are appended to the paths provided. Tape is not supported on OS/2.

The information provided in this structure depends on the value of the *media_type* field. Valid values (defined in `sqlutil`) are:

SQLU_LOCAL_MEDIA
If set to this value, the caller provides information through *sqlu_media_entry* structures. The *sessions* field indicates the number of *sqlu_media_entry* structures provided.

SQLU_TSM_MEDIA
If set to this value, the *sqlu_vendor* structure is used, where *filename* is the unique identifier for the data to be loaded. There should only be one *sqlu_vendor* entry, regardless of the value of *sessions*. The *sessions* field indicates the number of TSM sessions to initiate. The load utility will start the sessions with different sequence numbers, but with the same data in the one *sqlu_vendor* entry.

SQLU_OTHER_MEDIA
If set to this value, the *sqlu_vendor* structure is used, where *shr_lib* is the shared library name, and *filename* is the unique identifier for the data to be loaded. There should only be one *sqlu_vendor* entry, regardless of the value of *sessions*. The *sessions* field indicates the number of other vendor sessions to initiate. The load utility will start the sessions with different sequence numbers, but with the same data in the one *sqlu_vendor* entry.

For more information, see "SQLU-MEDIA-LIST" on page 518.

pDataDescriptor
Input. Pointer to an *sqldcol* structure containing information about the columns being selected for loading from the external file.

If the *pFileType* parameter is set to SQL_ASC, the *dcolmeth* field of this structure must be set to SQL_METH_L. The user specifies the start and end locations for each column to be loaded.

If the file type is SQL_DEL, *dcolmeth* can be either SQL_METH_P or SQL_METH_D. If it is SQL_METH_P, the user must provide the source column position. If it is SQL_METH_D, the first column in the file is loaded into the first column of the table, and so on.

If the file type is SQL_IXF, *dcolmeth* can be one of SQL_METH_P, SQL_METH_D, or SQL_METH_N. The rules for DEL files apply here, except that SQL_METH_N indicates that file column names are to be provided in the *sqldcol* structure.

For more information, see "SQLDCOL" on page 456.

pActionString
Input. Pointer to an *sqlchar* structure containing a 2-byte long field, followed by an array of characters specifying an action that affects the table.

The character array is of the form:

```
"INSERT|REPLACE|RESTART|TERMINATE
INTO tbname [(column_list)]
[DATALINK SPECIFICATION datalink-spec]
[FOR EXCEPTION e_tbname]"
```

INSERT
Adds the loaded data to the table without changing the existing table data.

REPLACE
Deletes all existing data from the table, and inserts the loaded data. The table definition and the index definitions are not changed.

RESTART
Restarts a previously interrupted load operation. The load operation will automatically continue from the last consistency point in the load, build, or delete phase.

TERMINATE
Terminates a previously interrupted load operation, and rolls back the operation to the point in time at which it started, even if consistency points were passed. The states of any table spaces involved in the operation return to normal, and all table objects are made consistent (index objects may be marked as invalid, in which case index rebuild will automatically take place at next access). If the table spaces in which the table resides are not in load pending state, this option does not affect the state of the table spaces.

The load terminate option will not remove a backup pending state from table spaces.

tbname The name of the table into which the data is to be loaded. The table cannot be a system table or a declared temporary table. An alias, or the fully qualified or unqualified table name can be specified. A qualified table name is in the form *schema.tablename*. If an unqualified table name is specified, the table will be qualified with the CURRENT SCHEMA.

(*column_list***)**
A list of table column names into which the data is to be inserted. The column names must be separated by commas. If a name contains spaces or lowercase characters, it must be enclosed by quotation marks.

DATALINK SPECIFICATION *datalink-spec*
Specifies parameters pertaining to DB2 Data Links. These parameters can be specified using the same syntax as in the LOAD command (see the *Command Reference*).

FOR EXCEPTION *e_tbname*
Specifies the exception table into which rows in error will be copied. Any row that is in violation of a unique index or a

primary key index is copied. DATALINK exceptions are also captured in the exception table.

pFileType
Input. A string that indicates the format of the data within the external file. Supported external file formats (defined in `sqlutil`) are:

SQL_ASC
Non-delimited ASCII.

SQL_DEL
Delimited ASCII, for exchange with dBase, BASIC, and the IBM Personal Decision Series programs, and many other database managers and file managers.

SQL_IXF
PC version of the Integrated Exchange Format, the preferred method for exporting data from a table so that it can be loaded later into the same table or into another database manager table.

For more information about file formats, see the "Export/Import/Load Utility File Formats" appendix in the *Data Movement Utilities Guide and Reference*.

pFileTypeMod
Input. A pointer to a structure containing a 2-byte long field, followed by an array of characters that specify one or more processing options. If this pointer is NULL, or the structure pointed to has zero characters, this action is interpreted as selection of a default specification.

Not all options can be used with all of the supported file types.

For more information, see "SQLCHAR" on page 452, and the *Command Reference*.

pLocalMsgFileName
Input. A string containing the name of a local file to which output messages are to be written.

pRemoteMsgFileName
Input. A string containing the path name to be used on the server for temporary files. Temporary files are created to store messages, consistency points, and delete phase information. For more information about temporary files, see *Data Movement Utilities Guide and Reference*.

CallerAction
Input. An action requested by the caller. Valid values (defined in `sqlutil`) are:

SQLU_INITIAL
Initial call. This value (or SQLU_NOINTERRUPT) must be used on the first call to the API.

SQLU_NOINTERRUPT
Initial call. Do not suspend processing. This value (or SQLU_INITIAL) must be used on the first call to the API.

If the initial call or any subsequent call returns and requires the calling application to perform some action prior to completing the requested load operation, the caller action must be set to one of the following:

SQLU_CONTINUE
Continue processing. This value can only be used on subsequent calls to the API, after the initial call has returned with the utility requesting user input (for example, to respond to an end of tape condition). It specifies that the user action requested by the utility has completed, and the utility can continue processing the initial request.

SQLU_TERMINATE
Terminate processing. Causes the load utility to exit prematurely, leaving the table spaces being loaded in LOAD_PENDING state. This option should be specified if further processing of the data is not to be done.

SQLU_ABORT
Terminate processing. Causes the load utility to exit prematurely, leaving the table spaces being loaded in LOAD_PENDING state. This option should be specified if further processing of the data is not to be done.

SQLU_RESTART
Restart processing.

SQLU_DEVICE_TERMINATE
Terminate a single device. This option should be specified if the utility is to stop reading data from the device, but further processing of the data is to be done.

pLoadInfoIn
Input. Optional pointer to the *sqluload_in* structure containing additional input parameters. For information about this structure, see "SQLULOAD-IN" on page 529.

pLoadInfoOut
Output. Optional pointer to the *sqluload_out* structure containing additional output parameters. For information about this structure, see "SQLULOAD-OUT" on page 534.

pWorkDirectoryList
Reserved.

pCopyTargetList
Input. A pointer to an *sqlu_media_list* structure used (if a copy image is to be created) to provide a list of target paths, devices, or a shared library to which the copy image is to be written.

The values provided in this structure depend on the value of the *media_type* field. Valid values for this field (defined in `sqlutil`) are:

SQLU_LOCAL_MEDIA
If the copy is to be written to local media, set the *media_type* to this value and provide information about the targets in *sqlu_media_entry* structures. The *sessions* field specifies the number of *sqlu_media_entry* structures provided.

SQLU_TSM_MEDIA
If the copy is to be written to TSM, use this value. No further information is required.

SQLU_OTHER_MEDIA
If a vendor product is to be used, use this value and provide further information via an *sqlu_vendor* structure. Set the *shr_lib* field of this structure to the shared library name of the vendor product. Provide only one *sqlu_vendor* entry, regardless of the value of *sessions*. The *sessions* field specifies the number of *sqlu_media_entry* structures provided. The load utility will start the sessions with different sequence numbers, but with the same data provided in the one *sqlu_vendor* entry.

For more information, see "SQLU-MEDIA-LIST" on page 518.

pNullIndicators
Input. For ASC files only. An array of integers that indicate whether or not the column data is nullable. There is a one-to-one ordered correspondence between the elements of this array and the columns being loaded from the data file. That is, the number of elements must equal the *dcolnum* field of the *pDataDescriptor* parameter. Each element of the array contains a number identifying a location in the data file that is to be used as a NULL indicator field, or a zero indicating that the table column is not nullable. If the element is not zero, the identified location in the data file must contain a `Y` or an `N`. A `Y` indicates that the table column data is NULL, and `N` indicates that the table column data is not NULL.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

This API can be called from REXX through the SQLDB2 interface. See "How the API Descriptions are Organized" on page 12, or the *Application Development Guide*. For a description of the syntax, see the *Command Reference*.

Sample Programs

C	\sqllib\samples\c\tload.sqc
COBOL	\sqllib\samples\cobol\tload.sqb

Usage Notes

Data is loaded in the sequence that appears in the input file. If a particular sequence is desired, the data should be sorted before a load is attempted.

The load utility builds indexes based on existing definitions. The exception tables are used to handle duplicates on unique keys. The utility does not enforce referential integrity, perform constraints checking, or update summary tables that are dependent on the tables being loaded. Tables that include referential or check constraints are placed in check pending state. Summary tables that are defined with REFRESH IMMEDIATE, and that are dependent on tables being loaded, are also placed in check pending state. Issue the SET INTEGRITY statement to take the tables out of check pending state. Load operations cannot be carried out on replicated summary tables.

If clustering is required, the data should be sorted on the clustering index prior to loading.

DB2 Data Links Manager Considerations

For each DATALINK column, there can be one column specification within parentheses. Each column specification consists of one or more of DL_LINKTYPE, *prefix* and a DL_URL_SUFFIX specification. The *prefix* information can be either DL_URL_REPLACE_PREFIX, or the DL_URL_DEFAULT_PREFIX specification.

There can be as many DATALINK column specifications as the number of DATALINK columns defined in the table. The order of specifications follows the order of DATALINK columns as found within the insert-column list (if specified by INSERT INTO (insert-column, ...)), or within the table definition (if insert-column is not specified).

For example, if a table has columns C1, C2, C3, C4, and C5, and among them only columns C2 and C5 are of type DATALINK, and the insert-column list is

(C1, C5, C3, C2), there should be two DATALINK column specifications. The first column specification will be for C5, and the second column specification will be for C2. If an insert-column list is not specified, the first column specification will be for C2, and the second column specification will be for C5.

If there are multiple DATALINK columns, and some columns do not need any particular specification, the column specification should have at least the parentheses to unambiguously identify the order of specifications. If there are no specifications for any of the columns, the entire list of empty parentheses can be dropped. Thus, in cases where the defaults are satisfactory, there need not be any DATALINK specification.

If data is being loaded into a table with a DATALINK column that is defined with FILE LINK CONTROL, perform the following steps before invoking the load utility. (If all the DATALINK columns are defined with NO LINK CONTROL, these steps are not necessary).

1. Ensure that the DB2 Data Links Manager is installed on the Data Links servers that will be referred to by the DATALINK column values.
2. Ensure that the database is registered with the DB2 Data Links Manager.
3. Copy to the appropriate Data Links servers, all files that will be inserted as DATALINK values.
4. Define the prefix name (or names) to the DB2 Data Links Managers on the Data Links servers.
5. Register the Data Links servers referred to by DATALINK data (to be loaded) in the DB2 Data Links Manager configuration file.

The connection between DB2 and the Data Links server may fail while running the load utility, causing the load operation to fail. If this occurs:

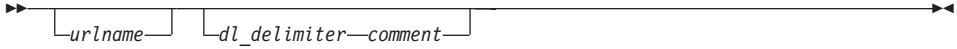
1. Start the Data Links server and the DB2 Data Links Manager.
2. Invoke a load restart operation.

Links that fail during the load operation are considered to be data integrity violations, and are handled in much the same way as unique index violations. Consequently, a special exception has been defined for loading tables that have one or more DATALINK columns. For additional information, refer to the description of exceptions in the *SQL Reference*.

Representation of DATALINK Information in an Input File

The LINKTYPE (currently only URL is supported) is not specified as part of DATALINK information. The LINKTYPE is specified in the LOAD or the IMPORT command, and for input files of type PC/IXF, in the appropriate column descriptor records as described in

The syntax of DATALINK information for a URL LINKTYPE is as follows:



Note that both *urlname* and *comment* are optional. If neither is provided, the NULL value is assigned.

urlname
The URL name must conform to valid URL syntax.

Notes:

1. Only "http" and "file" are permitted as a scheme name.
2. The prefix (scheme, host, and port) of the URL name is optional. If a prefix is not present, it is taken from the DL_URL_DEFAULT_PREFIX or the DL_URL_REPLACE_PREFIX specification of the load or the import utility. If none of these is specified, the prefix defaults to "file://localhost". Thus, in the case of local files, the file name with full path name can be entered as the URL name, without the need for a DATALINK column specification within the LOAD or the IMPORT command.
3. Prefixes, even if present in URL names, are overridden by a different prefix name on the DL_URL_REPLACE_PREFIX specification during a load or import operation.
4. The "path" (after appending DL_URL_SUFFIX, if specified) is the full path name of the remote file in the remote server. Relative path names are not allowed. The http server default path-prefix is not taken into account.

dl_delimiter
For the delimited ASCII (DEL) file format, a character specified via the `dldel` modifier, or defaulted to on the LOAD or the IMPORT command. For the non-delimited ASCII (ASC) file format, this should correspond to the character sequence **\;** (a backslash followed by a semicolon). Whitespace characters (blanks, tabs, and so on) are permitted before and after the value specified for this parameter.

comment
The comment portion of a DATALINK value. If specified for the delimited ASCII (DEL) file format, the *comment* text must be enclosed by the character string delimiter, which is double quotation marks (") by default. This character string delimiter can be overridden by the MODIFIED BY *filetype-mod* specification of the LOAD or the IMPORT command.

If no comment is specified, the comment defaults to a string of length zero.

Following are DATALINK data examples for the delimited ASCII (DEL) file format:

- `http://www.almaden.ibm.com:80/mrep/intro.mpeg; "Intro Movie"`

  This is stored with the following parts:
  - scheme = http
  - server = www.almaden.ibm.com
  - path = /mrep/intro.mpeg
  - comment = ″Intro Movie″
- `file://narang/u/narang; "InderPal's Home Page"`

  This is stored with the following parts:
  - scheme = file
  - server = narang
  - path = /u/narang
  - comment = ″InderPal's Home Page″
- `file:/home/ff.gg; "hi there"`

  This is stored with the following parts:
  - scheme = file
  - server = localhost
  - path = /home/ff.gg
  - comment = ″hi there″

Following are DATALINK data examples for the non-delimited ASCII (ASC) file format:

- `http://www.almaden.ibm.com:80/mrep/intro.mpeg\;Intro Movie`

  This is stored with the following parts:
  - scheme = http
  - server = www.almaden.ibm.com
  - path = /mrep/intro.mpeg
  - comment = ″Intro Movie″
- `file://narang/u/narang\; InderPal's Home Page`

  This is stored with the following parts:
  - scheme = file
  - server = narang
  - path = /u/narang
  - comment = ″InderPal's Home Page″
- `file:/home/ff.gg\; hi there`

This is stored with the following parts:

- scheme = file
- server = localhost
- path = /home/ff.gg
- comment = ″hi there″

Following are DATALINK data examples in which the load or import specification for the column is assumed to be DL_URL_DEFAULT_PREFIX (″http://qso″):

- `file://narang/pics/xxx.jpeg?search_pat`

  This is stored with the following parts:

  - scheme = file
  - server = narang
  - path = /pics/xxx.jpeg
  - comment = NULL string

- `/u/me/myfile.ps`

  This is stored with the following parts:

  - scheme = http
  - server = qso
  - path = /u/me/myfile.ps
  - comment = NULL string

Table 10. Valid File Type Modifiers (LOAD)

Modifier	Description
All File Formats	
anyorder	This modifier is used in conjunction with the *cpu_parallelism* parameter. Specifies that the preservation of source data order is not required, yielding significant additional performance benefit on SMP systems. If the value of *cpu_parallelism* is 1, this option is ignored. This option is not supported if SAVECOUNT > 0, since crash recovery after a consistency point requires that data be loaded in sequence.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
fastparse	Reduced syntax checking is done on user-supplied column values, and performance is enhanced. Tables loaded under this option are guaranteed to be architecturally correct, and the utility is guaranteed to perform sufficient data checking to prevent a segmentation violation or trap. Data that is in correct form will be loaded correctly. For example, if a value of `123qwr4` were to be encountered as a field entry for an integer column in an ASC file, the load utility would ordinarily flag a syntax error, since the value does not represent a valid number. With `fastparse`, a syntax error is not detected, and an arbitrary number is loaded into the integer field. Care must be taken to use this modifier with clean data only. Performance improvements using this option with ASCII data can be quite substantial, but `fastparse` does not significantly enhance performance with PC/IXF data, since IXF is a binary format, and `fastparse` affects parsing and conversion from ASCII to internal forms.
generatedignore	This modifier informs the load utility that data for all generated columns is present in the data file but should be ignored. For nullable generated columns, this results in NULLs being loaded into the column; for non-nullable generated columns, this results in the default value for the generated column's data type being loaded. At the end of the load operation, the SET INTEGRITY statement can be invoked to force the replacement of loaded values with values computed according to the generated column definition. This modifier cannot be used with either the `generatedmissing` or the `generatedoverride` modifier.
generatedmissing	If this modifier is specified, the utility assumes that the input data file contains no data for the generated column (not even NULLs), and will therefore load NULLs into the column. At the end of the load operation, the SET INTEGRITY statement can be used to replace the NULLs with values computed according to the generated column definition. This modifier cannot be used with either the `generatedignore` or the `generatedoverride` modifier.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
generatedoverride	This modifier instructs the load utility to accept explicit, non-NULL data for all generated columns in the table (contrary to the normal rules for these types of columns). This is useful when migrating data from another database system, or when loading a table from data that was recovered using the DROPPED TABLE RECOVERY option on the ROLLFORWARD DATABASE command. When this modifier is used, any rows with no data or NULL data for a non-nullable generated column will be rejected (SQL3116W). **Note:** The load utility will not attempt to validate generated column values when this option is used. This modifier cannot be used with either the `generatedmissing` or the `generatedignore` modifier.
identityignore	This modifier informs the load utility that data for the identity column is present in the data file but should be ignored. This results in all identity values being generated by the utility. The behavior will be the same for both GENERATED ALWAYS and GENERATED BY DEFAULT identity columns. This means that for GENERATED ALWAYS columns, no rows will be rejected. This modifier cannot be used with either the `identitymissing` or the `identityoverride` modifier.
identitymissing	If this modifier is specified, the utility assumes that the input data file contains no data for the identity column (not even NULLs), and will therefore generate a value for each row. The behavior will be the same for both GENERATED ALWAYS and GENERATED BY DEFAULT identity columns. This modifier cannot be used with either the `identityignore` or the `identityoverride` modifier.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
identityoverride	This modifier should be used only when an identity column defined as GENERATED ALWAYS is present in the table to be loaded. It instructs the utility to accept explicit, non-NULL data for such a column (contrary to the normal rules for these types of identity columns). This is useful when migrating data from another database system when the table must be defined as GENERATED ALWAYS, or when loading a table from data that was recovered using the DROPPED TABLE RECOVERY option on the ROLLFORWARD DATABASE command. When this modifier is used, any rows with no data or NULL data for the identity column will be rejected (SQL3116W). This modifier cannot be used with either the `identitymissing` or the `identityignore` modifier. **Note:** The load utility will not attempt to maintain or verify the uniqueness of values in the table's identity column when this option is used.
indexfreespace=*x*	*x* is an integer between 0 and 99 inclusive. The value is interpreted as the percentage of each index page that is to be left as free space when loading the index. The first entry in a page is added without restriction; subsequent entries are added if the percent free space threshold can be maintained. The default value is the one used at CREATE INDEX time. This value takes precedence over the PCTFREE value specified in the CREATE INDEX statement, and affects index leaf pages only.
lobsinfile	*lob-path* specifies the path to the files containing LOB values. The ASC, DEL, or IXF load input files contain the names of the files having LOB data in the LOB column.
noheader	Skips the header verification code (applicable only to load operations into tables that reside in a single-node nodegroup). The AutoLoader utility (see writes a header to each file contributing data to a table in a multi-node nodegroup. The header includes the node number, the partitioning map, and the partitioning key specification. The load utility requires this information to verify that the data is being loaded at the correct node. When loading files into a table that exists on a single-node nodegroup, the headers do not exist, and this option causes the load utility to skip the header verification code.
norowwarnings	Suppresses all warnings about rejected rows.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
pagefreespace=*x*	*x* is an integer between 0 and 100 inclusive. The value is interpreted as the percentage of each data page that is to be left as free space. If the specified value is invalid because of the minimum row size, (for example, a row that is at least 3 000 bytes long, and an *x* value of 50), the row will be placed on a new page. If a value of 100 is specified, each row will reside on a new page. **Note:** The PCTFREE value of a table determines the amount of free space designated per page. If a `pagefreespace` value on the load operation or a PCTFREE value on a table have not been set, the utility will fill up as much space as possible on each page. The value set by `pagefreespace` overrides the PCTFREE value specified for the table.
totalfreespace=*x*	*x* is an integer between 0 and 100 inclusive. The value is interpreted as the percentage of the total pages in the table that is to be appended to the end of the table as free space. For example, if *x* is 20, and the table has 100 data pages, 20 additional empty pages will be appended. The total number of data pages for the table will be 120.
usedefaults	If a source column for a target table column has been specified, but it contains no data for one or more row instances, default values are loaded. Examples of missing data are: • For DEL files: ",," is specified for the column • For DEL/ASC/WSF files: A row that does not have enough columns, or is not long enough for the original specification. Without this option, if a source column contains no data for a row instance, one of the following occurs: • If the column is nullable, a NULL is loaded • If the column is not nullable, the utility rejects the row.
ASCII File Formats (ASC/DEL)	

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
codepage=*x*	*x* is an ASCII character string. The value is interpreted as the code page of the data in the input data set. Converts character data (and numeric data specified in characters) from this code page to the database code page during the load operation. The following rules apply: • For pure DBCS (graphic), mixed DBCS, and EUC, delimiters are restricted to the range of x00 to x3F, inclusive. • For DEL data specified in an EBCDIC code page, the delimiters may not coincide with the shift-in and shift-out DBCS characters. • `nullindchar` must specify symbols included in the standard ASCII set between code points x20 and x7F, inclusive. This refers to ASCII symbols and code points. EBCDIC data can use the corresponding symbols, even though the code points will be different.

dateformat="*x*"	*x* is the format of the date in the source file.[a] Valid date elements are:
	`YYYY - Year (four digits ranging from 0000 - 9999)`
	`M - Month (one or two digits ranging from 1 - 12)`
	`MM - Month (two digits ranging from 1 - 12; mutually exclusive with M)`
	`D - Day (one or two digits ranging from 1 - 31)`
	`DD - Day (two digits ranging from 1 - 31; mutually exclusive with D)`
	`DDD - Day of the year (three digits ranging from 001 - 366; mutually exclusive with other day or month elements)`
	
	A default value of 1 is assigned for each element that is not specified. Some examples of date formats are:
	`"D-M-YYYY"`
	`"MM.DD.YYYY"`
	`"YYYYDDD"`

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

dumpfile = *x*	*x* is the fully qualified (according to the server node) name of an exception file to which rejected rows are written. A maximum of 32KB of data is written per record. Following is an example that shows how to specify a dump file:
	`db2 load from data of del`
	`modified by dumpfile = /u/user/filename`
	`insert into table_name`
	Notes:
	1. In a partitioned database environment, the path should be local to the loading node, so that concurrently running load operations do not attempt to write to the same file.
	2. The contents of the file are written to disk in an asynchronous buffered mode. In the event of a failed or an interrupted load operation, the number of records committed to disk cannot be known with certainty, and consistency cannot be guaranteed after a LOAD RESTART. The file can only be assumed to be complete for a load operation that starts and completes in a single pass.
	3. This modifier does not support file names with multiple file extensions. For example,
	`dumpfile = /home/svtdbm6/DUMP.FILE`
	is acceptable to the load utility, but
	`dumpfile = /home/svtdbm6/DUMP.LOAD.FILE`
	is not.

implieddecimal	The location of an implied decimal point is determined by the column definition; it is no longer assumed to be at the end of the value. For example, the value `12345` is loaded into a DECIMAL(8,2) column as `123.45`, *not* `12345.00`.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

timeformat="*x*"	*x* is the format of the time in the source file.[a] Valid time elements are:
	`H - Hour (one or two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system)`
	`HH - Hour (two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system; mutually exclusive with H)`
	`M - Minute (one or two digits ranging from 0 - 59)`
	`MM - Minute (two digits ranging from 0 - 59; mutually exclusive with M)`
	`S - Second (one or two digits ranging from 0 - 59)`
	`SS - Second (two digits ranging from 0 - 59; mutually exclusive with S)`
	`SSSSS - Second of the day after midnight (5 digits ranging from 00000 - 86399; mutually exclusive with other time elements)`
	`TT - Meridian indicator (AM or PM)`
	A default value of 0 is assigned for each element that is not specified. Some examples of time formats are:
	`"HH:MM:SS"`
	`"HH.MM TT"`
	`"SSSSS"`

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

timestampformat="*x*"	*x* is the format of the time stamp in the source file.[a] Valid time stamp elements are:
	`YYYY - Year (four digits ranging from 0000 - 9999)`
	`M - Month (one or two digits ranging from 1 - 12)`
	`MM - Month (two digits ranging from 1 - 12; mutually exclusive with M, month)`
	`D - Day (one or two digits ranging from 1 - 31)`
	`DD - Day (two digits ranging from 1 - 31; mutually exclusive with D)`
	`DDD - Day of the year (three digits ranging from 001 - 366; mutually exclusive with other day or month elements)`
	`H - Hour (one or two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system)`
	`HH - Hour (two digits ranging from 0 - 12 for a 12 hour system, and 0 - 24 for a 24 hour system; mutually exclusive with H)`
	`M - Minute (one or two digits ranging from 0 - 59)`
	`MM - Minute (two digits ranging from 0 - 59; mutually exclusive with M, minute)`
	`S - Second (one or two digits ranging from 0 - 59)`
	`SS - Second (two digits ranging from 0 - 59; mutually exclusive with S)`
	`SSSSS - Second of the day after midnight (5 digits ranging from 00000 - 86399; mutually exclusive with other time elements)`
	`UUUUUU - Microsecond (6 digits ranging from 000000 - 999999)`
	`TT - Meridian indicator (AM or PM)`
	A default value of 1 is assigned for unspecified YYYY, M, MM, D, DD, or DDD elements. A default value of 0 is assigned for all other unspecified elements. Following is an example of a time stamp format:
	`"YYYY/MM/DD HH:MM:SS.UUUUUU"`
	The following example illustrates how to import data containing user defined date and time formats into a table called schedule:
	`db2 import from delfile2 of del modified by timestampformat="yyyy.mm.dd hh:mm tt" insert into schedule`

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
noeofchar	The optional end-of-file character `x'1A'` is not recognized as the end of file. Processing continues as if it were a normal character.
ASC (Non-delimited ASCII) File Format	
binarynumerics	Numeric (but not DECIMAL) data must be in binary form, not the character representation. This avoids costly conversions. This option is supported only with positional ASC, using fixed length records specified by the `reclen` option. The `noeofchar` option is assumed. The following rules apply: • No conversion between data types is performed, with the exception of BIGINT, INTEGER, and SMALLINT. • Data lengths must match their target column definitions. • FLOATs must be in IEEE Floating Point format. • Binary data in the load source file is assumed to be big-endian, regardless of the platform on which the load operation is running. **Note:** NULLs cannot be present in the data for columns affected by this modifier. Blanks (normally interpreted as NULL) are interpreted as a binary value when this modifier is used.
nochecklengths	If `nochecklengths` is specified, an attempt is made to load each row, even if the source data has a column definition that exceeds the size of the target table column. Such rows can be successfully loaded if code page conversion causes the source data to shrink; for example, 4-byte EUC data in the source could shrink to 2-byte DBCS data in the target, and require half the space. This option is particularly useful if it is known that the source data will fit in all cases despite mismatched column definitions.
nullindchar=*x*	*x* is a single character. Changes the character denoting a NULL value to *x*. The default value of *x* is `Y`.[b] This modifier is case sensitive for EBCDIC data files, except when the character is an English letter. For example, if the NULL indicator character is specified to be the letter `N`, then `n` is also recognized as a NULL indicator.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

packeddecimal	Loads packed-decimal data directly, since the `binarynumerics` modifier does not include the DECIMAL field type.
	
	This option is supported only with positional ASC, using fixed length records specified by the `reclen` option. The `noeofchar` option is assumed.
	
	Supported values for the sign nibble are:
	`+ = 0xC 0xA 0xE 0xF`
	`- = 0xD 0xB`
	
	Note: NULLs cannot be present in the data for columns affected by this modifier. Blanks (normally interpreted as NULL) are interpreted as a binary value when this modifier is used.
	
	Regardless of the server platform, the byte order of binary data in the load source file is assumed to be big-endian; that is, when using this modifier on OS/2 or on the Windows operating system, the byte order must not be reversed.

reclen=*x*	*x* is an integer with a maximum value of 32 767. *x* characters are read for each row, and a new-line character is not used to indicate the end of the row.
striptblanks	Truncates any trailing blank spaces when loading data into a variable-length field. If this option is not specified, blank spaces are kept. This option cannot be specified together with `striptnulls`. These are mutually exclusive options. **Note:** This option replaces the obsolete `t` option, which is supported for back-level compatibility only.
striptnulls	Truncates any trailing NULLs (0x00 characters) when loading data into a variable-length field. If this option is not specified, NULLs are kept. This option cannot be specified together with `striptblanks`. These are mutually exclusive options. **Note:** This option replaces the obsolete `padwithzero` option, which is supported for back-level compatibility only.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

zoneddecimal	Loads zoned decimal data, since the BINARYNUMERICS modifier does not include the DECIMAL field type. This option is supported only with positional ASC, using fixed length records specified by the RECLEN option. The NOEOFCHAR option is assumed.
	
	Half-byte sign values can be one of the following:
	`+ = 0xC 0xA 0xE 0xF`
	`- = 0xD 0xB`
	
	Supported values for digits are `0x0` to `0x9`.
	
	Supported values for zones are `0x3` and `0xF`.

DEL (Delimited ASCII) File Format	
chardel*x*	*x* is a single character string delimiter. The default value is a double quotation mark ("). The specified character is used in place of double quotation marks to enclose a character string.[bc] The single quotation mark (') can also be specified as a character string delimiter as follows: `modified by chardel''`
coldel*x*	*x* is a single character column delimiter. The default value is a comma (,). The specified character is used in place of a comma to signal the end of a column.[bc]
datesiso	Date format. Causes all date data values to be loaded in ISO format.
decplusblank	Plus sign character. Causes positive decimal values to be prefixed with a blank space instead of a plus sign (+). The default action is to prefix positive decimal values with a plus sign.
decpt*x*	*x* is a single character substitute for the period as a decimal point character. The default value is a period (.). The specified character is used in place of a period as a decimal point character.[bc]

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

delprioritychar	The current default priority for delimiters is: record delimiter, character delimiter, column delimiter. This modifier protects existing applications that depend on the older priority by reverting the delimiter priorities to: character delimiter, record delimiter, column delimiter. Syntax:
	`db2 load ... modified by delprioritychar ...`
	
	For example, given the following DEL data file:
	`"Smith, Joshua",4000,34.98<row delimiter>`
	`"Vincent,<row delimiter>, is a manager", ...`
	`... 4005,44.37<row delimiter>`
	
	With the `delprioritychar` modifier specified, there will be only two rows in this data file. The second <row delimiter> will be interpreted as part of the first data column of the second row, while the first and the third <row delimiter> are interpreted as actual record delimiters. If this modifier is *not* specified, there will be three rows in this data file, each delimited by a <row delimiter>.

dldel*x*	*x* is a single character DATALINK delimiter. The default value is a semicolon (;). The specified character is used in place of a semicolon as the inter-field separator for a DATALINK value. It is needed because a DATALINK value may have more than one sub-value. [bcd] **Note:** *x* must not be the same character specified as the row, column, or character string delimiter.

keepblanks	Preserves the leading and trailing blanks in each field of type CHAR, VARCHAR, LONG VARCHAR, or CLOB. Without this option, all leading and tailing blanks that are not inside character delimiters are removed, and a NULL is inserted into the table for all blank fields.
	
	The following example illustrates how to load data into a table called TABLE1, while preserving all leading and trailing spaces in the data file:
	`db2 load from delfile3 of del`
	`modified by keepblanks`
	`insert into table1`

nodoubledel	Suppresses recognition of double character delimiters. For more information, see "Delimiter Restrictions" on page 312.
IXF File Format	

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description
forcein	Directs the utility to accept data despite code page mismatches, and to suppress translation between code pages. Fixed length target fields are checked to verify that they are large enough for the data. If `nochecklengths` is specified, no checking is done, and an attempt is made to load each row.
nochecklengths	If `nochecklengths` is specified, an attempt is made to load each row, even if the source data has a column definition that exceeds the size of the target table column. Such rows can be successfully loaded if code page conversion causes the source data to shrink; for example, 4-byte EUC data in the source could shrink to 2-byte DBCS data in the target, and require half the space. This option is particularly useful if it is known that the source data will fit in all cases despite mismatched column definitions.

Table 10. Valid File Type Modifiers (LOAD) (continued)

Modifier	Description

Notes:
1. The load utility does not issue a warning if an attempt is made to use unsupported file types with the MODIFIED BY option. If this is attempted, the load operation fails, and an error code is returned.
2. [a] Double quotation marks around the date format string are mandatory. Field separators cannot contain any of the following: a-z, A-Z, and 0-9. The field separator should not be the same as the character delimiter or field delimiter in the DEL file format. A field separator is optional if the start and end positions of an element are unambiguous. Ambiguity can exist if (depending on the modifier) elements such as D, H, M, or S are used, because of the variable length of the entries.
For time stamp formats, care must be taken to avoid ambiguity between the month and the minute descriptors, since they both use the letter M. A month field must be adjacent to other date fields. A minute field must be adjacent to other time fields. Following are some ambiguous time stamp formats:
`"M" (could be a month, or a minute)`
`"M:M" (Which is which?)`
`"M:YYYY:M" (Both are interpreted as month.)`
`"S:M:YYYY" (adjacent to both a time value and a date value)`
In ambiguous cases, the utility will report an error message, and the operation will fail.
Following are some unambiguous time stamp formats:
`"M:YYYY" (Month)`
`"S:M" (Minute)`
`"M:YYYY:S:M" (Month....Minute)`
`"M:H:YYYY:M:D" (Minute....Month)`
Note: Some characters, such as double quotation marks and back slashes, must be preceded by an escape character (for example, \).
3. [b] The character must be specified in the code page of the source data.
The character code point (instead of the character symbol), can be specified using the syntax xJJ or 0xJJ, where JJ is the hexadecimal representation of the code point. For example, to specify the # character as a column delimiter, use one of the following:
`... modified by coldel# ...`
`... modified by coldel0x23 ...`
`... modified by coldelX23 ...`
4. [c] "Delimiter Restrictions" on page 312 lists restrictions that apply to the characters that can be used as delimiter overrides.
5. [d] Even if the DATALINK delimiter character is a valid character within the URL syntax, it will lose its special meaning within the scope of the load operation.	

See Also

"db2LoadQuery - Load Query" on page 65

"sqluvqdp - Quiesce Tablespaces for Table" on page 413.

sqlurcon - Reconcile

Validates the references to files for the DATALINK data of a table. The rows for which the references to files cannot be established are copied to the exception table (if specified), and modified in the input table.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- CONTROL privilege on the table.

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Reconcile */
/* ... */
SQL_API_RC SQL_API_FN
  sqlurcon (
    char * pTableName,
    char * pExTableName,
    char * pReportFileName,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Reconcile */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgrcon (
    unsigned short TableNameLen,
    char * pTableName,
    unsigned short ExTableNameLen,
    char * pExTableName,
    unsigned short ReportFleNameLen,
    char * pReportFileName,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

TableNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the table name.

pTableName
Input. Specifies the table on which reconciliation is to be performed. An alias, or the fully qualified or unqualified table name can be specified. A qualified table name is in the form *schema.tablename*. If an unqualified table name is specified, the table will be qualified with the current authorization ID.

ExTableNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the exception table name.

pExTableName
Input. Specifies the exception table into which rows that encounter link failures for DATALINK values are to be copied.

ReportFileNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the report file name.

pReportFileName
Input. Specifies the file that will contain information about the files that are unlinked during reconciliation. The name must be fully qualified (for example, `/u/johnh/report`). The reconcile utility appends a `.ulk` extension to the specified file name (for example, `report.ulk`).

pReserved
Reserved for future use.

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

During reconciliation, attempts are made to link files which exist according to table data, but which do not exist according to Data Links File Manager metadata, if no other conflict exists.

Reconciliation is performed with respect to all DATALINK data in the table. If file references cannot be re-established, the violating rows are inserted into the exception table (if specified). These rows are not deleted from the input table. To ensure file reference integrity, the offending DATALINK values are nulled. If the column is defined as not nullable, the DATALINK values are replaced by a zero length URL.

If an exception table is not specified, the DATALINK column values for which file references cannot be re-established are copied to an exception report file (`<pReportFileName>.exp`), along with the column ID and a comment.

At the end of the reconciliation process, the table is taken out of datalink reconcile pending (DRP) state.

sqlureot - Reorganize Table

Reorganizes a table by reconstructing the rows to eliminate fragmented data, and by compacting information.

Scope

This API affects all nodes in the nodegroup.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- CONTROL privilege on the table.

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Reorganize Table */
/* ... */
SQL_API_RC SQL_API_FN
  sqlureot (
    _SQLOLDCHAR * pTableName,
    _SQLOLDCHAR * pIndexName,
    _SQLOLDCHAR * pTablespace,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Reorganize Table */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgreot (
    unsigned short TablespaceLen,
    unsigned short IndexNameLen,
    unsigned short TableNameLen,
    struct sqlca * pSqlca,
    _SQLOLDCHAR * pTablespace,
    _SQLOLDCHAR * pIndexName,
    _SQLOLDCHAR * pTableName);
/* ... */
```

API Parameters

TablespaceLen
Input. A 2-byte unsigned integer representing the length in bytes of the table space string. Set to zero if no table space is specified.

IndexNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the index name. Set to zero if no index is specified.

TableNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the table name.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

pTablespace
Input. A string containing the name of the system temporary table space if the caller wants a secondary work area when reorganizing a table. May be NULL.

pIndexName
Input. The fully qualified index name to be used when reorganizing the user table. The records in the reorganized table are physically ordered according to this index. Setting this parameter to NULL causes the data to be reorganized in no specific order.

pTableName
Input. Name of the table to be reorganized. Can be an alias, except in the case of a down-level server, when the fully qualified name of the table must be used.

REXX API Syntax

```
REORG TABLE tablename [INDEX iname] [USE tablespace_id]
```

REXX API Parameters

tablename
The fully qualified name of the table.

iname The fully qualified index name used to reorganize the table. If an index name is not specified, the data is reorganized in no specific order.

tablespace_id
The name of a system temporary table space.

Sample Programs

C	\sqllib\samples\c\dbstat.sqc
COBOL	\sqllib\samples\cobol\dbstat.sqb
REXX	\sqllib\samples\rexx\dbstat.cmd

Usage Notes

This API is not supported for declared temporary tables.

Tables that have been modified so many times that data is fragmented and access performance is noticeably slow are candidates for reorganization. Use "REORGCHK" in the *Command Reference* to determine whether a table needs reorganizing. Be sure to complete all database operations and release all locks before calling REORGANIZE TABLE. This may be done by issuing a COMMIT after closing all cursors opened WITH HOLD, or by issuing a ROLLBACK. After reorganizing a table, use “sqlustat - Runstats” on page 407 to update the table statistics, and “sqlarbnd - Rebind” on page 99 to rebind the packages that use this table.

If the table is partitioned onto several nodes, and the table reorganization fails on any of the affected nodes, then only the failing nodes will have the table reorganization rolled back.

Note: If the reorganization is not successful, temporary files should not be deleted. The database manager uses these files to recover the database.

If the name of an index is specified, the database manager reorganizes the data according to the order in the index. To maximize performance, specify an index that is often used in SQL queries. If the name of an index is *not* specified, and if a clustering index exists, the data will be ordered according to the clustering index.

The PCTFREE value of a table determines the amount of free space designated per page. If the value has not been set, the utility will fill up as much space as possible on each page.

REORGANIZE TABLE cannot be used on views.

REORGANIZE TABLE cannot be used on a DMS table while an online backup of a table space in which the table resides is being performed.

To complete a table space roll-forward recovery following a table reorganization, both data and LONG table spaces must be roll-forward enabled.

If the table contains LOB columns that do not use the COMPACT option, the LOB DATA storage object can be significantly larger following table reorganization. This can be a result of the order in which the rows were reorganized, and the types of table spaces used (SMS/DMS).

DB2 Version 2 servers do not support down-level client requests to reorganize a table. Since pre-Version 2 servers do not support table spaces, the *pTablespace* parameter is treated as the Version 1 *path* parameter, when Version 2 clients are used with a down-level server.

If a Version 2 client requests to reorganize a table on a Version 2 server, and that request includes a path instead of a temporary table space in the *pTablespace* parameter (for example, an old application, specifying a temporary file path, being executed on Version 2 clients), REORG chooses a system temporary table space in which to place the work files on behalf of the user. A valid system temporary table space name containing a path separator character (/ or \) should not be specified, because it will be interpreted as a temporary path (pre-Version 2 request), and REORG will choose a system temporary table space on behalf of the user.

REORGANIZE TABLE cannot use an index that is based on an index extension.

See Also

"sqlarbnd - Rebind" on page 99

"sqlustat - Runstats" on page 407.

sqlurestore - Restore Database

Rebuilds a damaged or corrupted database that has been backed up using "sqlubkp - Backup Database" on page 290. The restored database is in the same state it was in when the backup copy was made. This utility can also restore to a database with a name different from the database name in the backup image (in addition to being able to restore to a new database).

This utility can also be used to restore DB2 databases created in the two previous releases.

This utility can also restore from a table space level backup.

Note: This API supersedes **sqlurst** (DB2 Version 5.0), and should be used with DB2 Data Links Manager. If DB2 Data Links Manager function is not required, **sqlurst** can be used.

Scope

This API only affects the node from which it is called.

Authorization

To restore to an existing database, one of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

To restore to a new database, one of the following:

- *sysadm*
- *sysctrl*

Required Connection

Database, to restore to an existing database. This API automatically establishes a connection to the specified database.

Instance and database, to restore to a new database. The instance attachment is required to create the database.

To restore to a new database at an instance different from the current instance (as defined by the value of the **DB2INSTANCE** environment variable), it is necessary to first attach to the instance where the new database will reside.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Restore Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlurestore (
    char * pSourceDbAlias,
    char * pTargetDbAlias,
    sqluint32 BufferSize,
    sqluint32 RollforwardMode,
    sqluint32 DatalinkMode,
    sqluint32 RestoreType,
    sqluint32 RestoreMode,
    sqluint32 CallerAction,
    char * pApplicationId,
    char * pTimestamp,
    char * pTargetPath,
    sqluint32 NumBuffers,
    char * pReportFile,
    struct sqlu_tablespace_bkrst_list * pTablespaceList,
    struct sqlu_media_list * pMediaSourceList,
    char * pUserName,
    char * pPassword,
    void * pReserved2,
    sqluint32 VendorOptionsSize,
    void * pVendorOptions,
    sqluint32 Parallelism,
    void * pRestoreInfo,
    void * pContainerPageList,
    void * pReserved3,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Restore Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgrestore (
   unsigned short SourceDbAliasLen,
   unsigned short TargetDbAliasLen,
   unsigned short TimestampLen,
   unsigned short TargetPathLen,
   unsigned short UserNameLen,
   unsigned short PasswordLen,
   unsigned short ReportFileLen,
   unsigned short Reserved2Len,
   char * pSourceDbAlias,
   char * pTargetDbAlias,
   sqluint32 BufferSize,
   sqluint32 RollforwardMode,
   sqluint32 DatalinkMode,
   sqluint32 RestoreType,
   sqluint32 RestoreMode,
   sqluint32 CallerAction,
   char * pApplicationId,
   char * pTimestamp,
   char * pTargetPath,
   sqluint32 NumBuffers,
   char * pReportFile,
   struct sqlu_tablespace_bkrst_list * pTablespaceList,
   struct sqlu_media_list * pMediaSourceList,
   char * pUserName,
   char * pPassword,
   void * pReserved2,
   sqluint32 VendorOptionsSize,
   void * pVendorOptions,
   sqluint32 Parallelism,
   unsigned short RestoreInfoSize,
   void * pRestoreInfo,
   unsigned short ContainerPageListSize,
   void * pContainerPageList,
   void * pReserved3,
   struct sqlca * pSqlca);
/* ... */
```

API Parameters

SourceDbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the source database alias.

TargetDbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the target database alias. Set to zero if no target database alias is specified.

TimestampLen
Input. A 2-byte unsigned integer representing the length in bytes of the time stamp. Set to zero if no time stamp is provided.

TargetPathLen
Input. A 2-byte unsigned integer representing the length in bytes of the target directory. Set to zero if no target path is provided.

UserNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the user name. Set to zero if no user name is provided.

PasswordLen
Input. A 2-byte unsigned integer representing the length in bytes of the password. Set to zero if no password is provided.

ReportFileLen
Input. A 2-byte unsigned integer representing the length in bytes of the report file name. Set to zero if no report file name is provided.

Reserved2Len
Input. A 2-byte unsigned integer representing the length in bytes of the reserved area. Set to zero.

pSourceDbAlias
Input. A string containing the database alias of the source database backup image.

pTargetDbAlias
Input. A string containing the target database alias. If this parameter is null, the *pSourceDbAlias* alias is used.

BufferSize
Input. Backup buffer size in 4KB allocation units (pages). Minimum is 8 units. The default is 1024 units.

Note: The buffer size entered for a restore must be equal to or an integer multiple of the buffer size used to produce the backup image.

RollforwardMode
Input. Indicates whether or not to place the database in rollforward pending state at the end of the restore. Valid values (defined in `sqlutil`) are:

SQLUD_ROLLFWD
Place the database in roll-forward pending state after it has been successfully restored.

SQLUD_NOROLLFWD
Do not place the database in roll-forward pending state after it has been successfully restored.

If, following a successful restore, the database is in roll-forward pending state, "sqluroll - Rollforward Database" on page 397 must be executed before the database can be used.

DatalinkMode
Input. Specifies whether any tables with DATALINK columns are to be placed in DataLink_Reconcile_Pending (DRP) state, and whether reconciliation of linked files is to be performed. Valid values (defined in `sqlutil`) are:

SQLUD_DATALINK
Perform reconciliation operations. Tables with a defined DATALINK column must have the RECOVERY YES option specified.

SQLUD_NODATALINK
Do not perform reconciliation operations. Tables with DATALINK columns are placed in DataLink_Reconcile_Pending (DRP) state. Tables with a defined DATALINK column must have the RECOVERY YES option specified.

RestoreType
Input. Specifies the type of restore. Valid values (defined in `sqlutil`) are:

SQLUD_FULL
Restore everything from the backup image. This will be run offline.

SQLUD_ONLINE_TABLESPACE
Restore only the table space level backups. This will be run online.

SQLUD_HISTORY
Restore only the recovery history file.

RestoreMode
Input. Specifies whether the restore is to be performed offline or online. Valid values (defined in `sqlutil`) are:

SQLUD_OFFLINE
Perform an offline restore operation.

SQLUD_ONLINE
Perform an online restore operation.

CallerAction
Input. Specifies the type of action to be taken. Valid values (defined in `sqlutil`) are:

SQLUD_RESTORE
Start the restore.

SQLUD_NOINTERRUPT
Start the restore. Specifies that the restore will run unattended, and that scenarios which normally require user intervention will either be attempted without first returning to the caller, or will generate an error. Use this caller action, for example, when all of the media required for the restore are known to have been mounted, and utility prompts are not desired.

SQLUD_CONTINUE
Continue the restore after the user has performed some action requested by the utility (mount a new tape, for example).

SQLUD_TERMINATE
Terminate the restore after the user has failed to perform some action requested by the utility.

SQLUD_DEVICE_TERMINATE
Remove a particular device from the list of devices used by the restore utility. When a particular device has exhausted its input, restore will return a warning to the caller. Call restore again with this caller action, and the device which generated the warning will be removed from the list of devices being used.

SQLUD_PARM_CHECK
Validate parameters without performing the restore.

SQLUD_RESTORE_STORDEF
Initial call. Table space container redefinition requested.

CallerAction must be set to `SQLUD_RESTORE`, `SQLUD_NOINTERRUPT`, `SQLUD_RESTORE_STORDEF`, or `SQLUD_PARM_CHECK` on the first call.

pApplicationId
Output. Supply a buffer of length `SQLU_APPLID_LEN+1` (defined in `sqlutil`). Restore will return a string identifying the agent servicing the application. Can be used with the database system monitor APIs to monitor some aspects of the application.

pTimestamp
Input. A string representing the time stamp of the backup image. This field is optional if there is only one backup image in the source specified.

pTargetPath
Input. A string containing the relative or fully qualified name of the target database directory. Used if a new database is to be created for the restored backup.

NumBuffers
Input. The number of buffers to be used for the restore.

pReportFile
The file name, if specified, must be fully qualified. The files which become unlinked during restore (as a result of a fast reconcile) will be reported.

pTablespaceList
Specifies one or more table spaces to be restored. Used when restoring a subset of the backup image or a table space from a table space backup image.

The following restrictions apply:

- The database must be recoverable; that is, *log retain* or user exits must be enabled.
- The database being restored to must be the same database that was used to create the backup image. That is, table spaces can not be added to a database through the table space restore function.
- This function is not available when restoring from a user exit on OS/2.
- The rollforward utility will ensure that table spaces restored in an MPP environment are synchronized with any other node containing the same table spaces.

Note: When restoring a table space that has been renamed since it was backed up, the new table space name must be used in the restore command. If the old table space name is used, it will not be found.

pMediaSourceList
Input. Source media for the backup image. See structure "SQLU-MEDIA-LIST" on page 518. The information the caller needs to provide in this structure is dependent upon the value of the *media_type* field. Valid values for this field (defined in `sqlutil`) are:

SQLU_LOCAL_MEDIA
Local devices (a combination of tapes, disks, or diskettes). Provide a list of *sqlu_media_entry* structures. On OS/2 or the Windows operating system, the entries can be directory paths only, not tape device names.

SQLU_TSM_MEDIA
TSM. No additional input is required, and the TSM shared library provided with DB2 is used. If a different version of TSM is desired, use SQLU_OTHER_MEDIA and provide the shared library name.

SQLU_OTHER_MEDIA
Vendor product. Provide the shared library name in an *sqlu_vendor* structure.

SQLU_USER_EXIT
User exit. No additional input is required (available on OS/2 only).

For more information, see the *Administration Guide*.

pUserName
Input. A string containing the user name to be used for a connection.

pPassword
Input. A string containing the password to be used with the user name for a connection.

pReserved2
Reserved for future use.

VendorOptionsSize
Input. The length of the vendor options field which cannot exceed 65535 bytes.

pVendorOptions
Input. To be used by the vendor to pass information from the application to the vendor functions. This data structure must be flat; that is, no level of indirection is supported. Note that byte-reversal is not done, and the code page for this data is not checked.

Parallelism
Input. Degree of intra-partition parallelism (number of buffer manipulators).

RestoreInfoSize
Reserved for future use.

pRestoreInfo
Reserved for future use.

ContainerPageListSize
Reserved for future use.

pContainerPageList
Reserved for future use.

pReserved3
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
RESTORE DATABASE source-database-alias [USING :value] [USER username USING password]
[TABLESPACE :tablespacenames] [ONLINE | HISTORY FILE ]
[LOAD shared-library [OPTIONS vendor-options] [OPEN num-sessions SESSIONS] |
 FROM :source-area | USE TSM [OPEN num-sessions SESSIONS] | USER_EXIT]
[TAKEN AT timestamp] [TO target-directory] [INTO target-database-alias]
[ACTION caller-action] [WITH num-buffers BUFFERS] [BUFFERSIZE buffer-size]
[WITHOUT ROLLING FORWARD] [PARALLELISM parallelism-degree]
```

REXX API Parameters

source-database-alias
Alias of the source database from which the database backup image was taken.

value A compound REXX host variable to which the database restore information is returned. In the following, XXX represents the host variable name:

XXX.0	Number of elements in the variable (always 1)
XXX.1	An application ID that identifies the agent that serves the application.

username
Identifies the user name to be used for connection.

password
The password used to authenticate the user name.

tablespacenames
A compound REXX host variable containing a list of table spaces to be restored. In the following, XXX is the name of the host variable:

XXX.0	Number of table spaces to be restored
XXX.1	First table space name
XXX.2	Second table space name
XXX.3	and so on.

HISTORY FILE
Specifies to restore the history file from the backup.

shared-library
The name of the shared library (DLL on OS/2 or the Windows operating system) containing the vendor restore I/O functions to be used. It may contain the full path. If the full path is not given, defaults to the path on which the user exit program resides.

vendor-options
Information required by the vendor functions.

num-sessions
The number of I/O sessions to be used with TSM or the vendor product.

source-area
A compound REXX host variable that indicates on which directory or device the backup image resides. The default value is the current directory. On OS/2 or the Windows operating system, the entries can be directory paths only, not tape device names.

timestamp
The time stamp of the database backup.

target-directory
The directory of the target database.

target-database-alias
Alias of the target database. If the target database does not exist, it will be created.

caller-action
Specifies action to be taken. Valid values are:

SQLUD_RESTORE
Start the restore.

SQLUD_NOINTERRUPT
Start the restore. Specifies that the restore will run unattended, and that scenarios which normally require user intervention will either be attempted without first returning to the caller, or will generate an error. Use this caller action, for example, when all of the media required for the restore are known to have been mounted, and utility prompts are not desired.

SQLUD_CONTINUE
Continue the restore after the user has performed some action requested by the utility (mount a new tape, for example).

SQLUD_TERMINATE
Terminate the restore after the user has failed to perform some action requested by the utility.

SQLUD_DEVICE_TERMINATE
Remove a particular device from the list of devices used by the restore utility. When a particular device has exhausted its input, restore will return a warning to the caller. Call restore again with this caller action, and the device which generated the warning will be removed from the list of devices being used.

SQLUD_PARM_CHECK
Validate parameters without performing the restore.

SQLUD_RESTORE_STORDEF
Initial call. Table space container redefinition requested.

num-buffers
Number of backup buffers to be used.

buffer-size
Backup buffer size in allocation units of 4KB. Minimum is 16 units.

parallelism-degree
Number of buffer manipulators.

Sample Programs

C	\sqllib\samples\c\backrest.c
COBOL	\sqllib\samples\cobol\backrest.cbl

Usage Notes

For offline restore, this utility connects to the database in exclusive mode. The utility fails if any application, including the calling application, is already connected to the database that is being restored. In addition, the request will fail if the operating system restore utility is being used to perform the restore, and any application, including the calling application, is already connected to any database on the same workstation. If the connect is successful, the API locks out other applications until the restore is completed.

The current database configuration file will not be replaced by the backup copy unless it is unusable. If the file is replaced, a warning message is returned.

The database or table space must have been backed up using “sqlubkp - Backup Database” on page 290.

If the caller action is `SQLUD_NOINTERRUPT`, the restore continues without prompting the application. If the caller action is `SQLUD_RESTORE`, and the utility is restoring to an existing database, the utility returns control to the application with a message requesting some user interaction. After handling the user interaction, the application calls RESTORE DATABASE again, with

the caller action set to indicate whether processing is to continue (SQLUD_CONTINUE) or terminate (SQLUD_TERMINATE) on the subsequent call. The utility finishes processing, and returns an SQLCODE in the *sqlca*.

To close a device when finished, set the caller action to SQLUD_DEVICE_TERMINATE. If, for example, a user is restoring from 3 tape volumes using 2 tape devices, and one of the tapes has been restored, the application obtains control from the API with an SQLCODE indicating end of tape. The application can prompt the user to mount another tape, and if the user indicates "no more", return to the API with caller action SQLUD_DEVICE_TERMINATE to signal end of the media device. The device driver will be terminated, but the rest of the devices involved in the restore will continue to have their input processed until all segments of the restore set have been restored (the number of segments in the restore set is placed on the last media device during the backup process). This caller action can be used with devices other than tape (vendor supported devices).

To perform a parameter check before returning to the application, set caller action to SQLUD_PARM_CHECK.

Set caller action to SQLUD_RESTORE_STORDEF when performing a redirected restore; used in conjunction with "sqlbstsc - Set Tablespace Containers" on page 124. For more information, see the *Administration Guide*.

If an error occurs, the utility terminates and returns the error in the *sqlca* structure.

If a system failure occurs during a critical stage of restoring a database, the user will not be able to successfully connect to the database until a successful restore is performed. This condition will be detected when the connection is attempted, and an error message is returned. If the backed-up database is not configured for roll-forward recovery, and there is a usable current configuration file with either of these parameters enabled, following the restore, the user will be required to either take a new backup of the database, or disable the log retain and user exit parameters before connecting to the database.

Although the restored database will not be dropped (unless restoring to a nonexistent database), if the restore fails, it will not be usable.

If the restore type specifies that the recovery history file on the backup is to be restored, it will be restored over the existing recovery history file for the database, effectively erasing any changes made to the history file after the backup that is being restored. If this is undesirable, restore the history file to a new or test database so that its contents can be viewed without destroying any updates that have taken place.

If, at the time of the backup operation, the database was enabled for roll forward recovery, the database can be brought to the state it was in prior to the occurrence of the damage or corruption by issuing **sqluroll** after successful execution of **sqlurestore**. If the database is recoverable, it will default to roll forward pending state after the completion of the restore.

If the database backup image is taken offline, and the caller does not want to roll forward the database after the restore, the *RollforwardMode* parameter can be set to SQLUD_NOROLLFWD. This results in the database being useable immediately after the restore. If the backup image is taken online, the caller must roll forward through the corresponding log records at the completion of the restore.

See Also

"sqlbstsc - Set Tablespace Containers" on page 124

"sqlemgdb - Migrate Database" on page 221

"sqlfxdb - Get Database Configuration" on page 275

"sqlubkp - Backup Database" on page 290

"sqluroll - Rollforward Database" on page 397.

sqlurlog - Asynchronous Read Log

Provides the caller with the ability to extract certain log records from the DB2 Common Server database logs, and to query the Log Manager for current log state information. This API can only be used on databases with recoverable database logs (the configuration parameters LOGRETAIN or USEREXIT enabled).

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Asynchronous Read Log */
/* ... */
SQL_API_RC SQL_API_FN
  sqlurlog (
    sqluint32 CallerAction,
    SQLU_LSN * pStartLsn,
    SQLU_LSN * pEndLsn,
    char * pLogBuffer,
    sqluint32 LogBufferSize,
    SQLU_RLOG_INFO * pReadLogInfo,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

CallerAction
Input. Specifies the action to be performed.

SQLU_RLOG_READ
Read the database log from the starting log sequence to the ending log sequence number and return all propagatable log records within this range.

SQLU_RLOG_READ_SINGLE
Read a single log record (propagatable or not) identified by the starting log sequence number.

SQLU_RLOG_QUERY
Query the database log. Results of the query will be sent back

via the SQLU_RLOG_INFO structure (see "SQLU-RLOG-INFO" on page 522).

pStartLsn
Input. The starting log sequence number specifies the starting relative byte address for the reading of the log. This value must be the start of an actual log record.

pEndLsn
Input. The ending log sequence number specifies the ending relative byte address for the reading of the log. This value must be greater than *startLsn*, and does not need to be the end of an actual log record.

pLogBuffer
Output. The buffer where all the propagatable log records read within the specified range are stored sequentially. This buffer must be large enough to hold a single log record. As a guideline, this buffer should be a minimum of 32 bytes. Its maximum size is dependent on the size of the requested range. Each log record in the buffer is prefixed by a six byte log sequence number (LSN), representing the LSN of the following log record.

LogBufferSize
Output. Specifies the size, in bytes, of the log buffer.

pReadLogInfo
Output. A structure detailing information regarding the call and the database log. For more information about this structure, see "SQLU-RLOG-INFO" on page 522.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Sample Programs

C \sqllib\samples\c\asynrlog.sqc

Usage Notes

If the requested action is to read the log, the caller will provide a log sequence number range and a buffer to hold the log records. The ASYNCHRONOUS READ LOG API reads the log sequentially, bounded by the requested LSN range, and returns log records associated with tables having the DATA CAPTURE option CHANGES, and an SQLU_RLOG_INFO structure with the current active log information. If the requested action is query, the API returns an SQLU_RLOG_INFO structure with the current active log information.

To use the Asynchronous Log Reader, first query the database log for a valid starting LSN. Following the query call, the read log information structure (SQLU-RLOG-INFO) will contain a valid starting LSN (in the initialLSN

member), to be used on a read call. The end of the current active log will be in the curActiveLSN member of the read log information structure. The value used as the ending LSN on a read can be one of the following:

- The value of the curActiveLSN
- A value greater than initialLSN
- `FFFF FFFF FFFF` which is interpreted by the asynchronous log reader as the end of the current log.

For more information about the read log information structure, see "SQLU-RLOG-INFO" on page 522.

The propagatable log records read within the starting and ending LSN range are returned in the log buffer. A log record does not contain its LSN, it is contained in the buffer before the actual log record. Descriptions of the various DB2 Common Server log records returned by **sqlurlog** can be found in "Appendix F. DB2 Common Server Log Records" on page 603.

After the initial read, in order to read the next sequential log record, add 1 to the last read LSN returned in SQLU-RLOG-INFO. Resubmit the call, with this new starting LSN and a valid ending LSN. The next block of records is then read. An sqlca code of SQLU_RLOG_READ_TO_CURRENT means the log reader has read to the end of the current active log.

sqluroll - Rollforward Database

Recovers a database by applying transactions recorded in the database log files. Called after a database or a table space backup has been restored, or if any table spaces have been taken offline by the database due to a media error. The database must be recoverable (that is, either *logretain*, *userexit*, or both of these database configuration parameters must be set on) before the database can be recovered with roll-forward recovery.

Scope

In a multi-node environment, this API can only be called from the catalog node. A database or table space rollforward call specifying a point-in-time affects all nodes that are listed in the `db2nodes.cfg` file. A database or table space rollforward call specifying end of logs affects the nodes that are specified. If no nodes are specified, it affects all nodes that are listed in the `db2nodes.cfg` file; if no roll forward is needed on a particular node, that node is ignored.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*

Required Connection

None. This API establishes a database connection.

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Rollforward Database */
/* ... */
SQL_API_RC SQL_API_FN
  sqluroll (
    struct rfwd_input * pRfwdInput,
    struct rfwd_output * pRfwdOuput,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Rollforward Database */
/* ... */
SQL_API_RC SQL_API_RN
  sqlgroll (
    struct grfwd_input * grfwdin,
    struct rfwd_output * rfwdout,
    struct sqlca * sqlca);

SQL_STRUCTURE grfwd_input
{
   unsigned short DbAliasLen,
   unsigned short StopTimeLen,
   unsigned short UserNameLen,
   unsigned short PasswordLen,
   unsigned short OverflowLogPathLen,
   unsigned short ReportFileLen,      /* NOTE: This parameter is no longer used */
                                      /*       for the DB2 Data Links Manager. */
   sqluint32 Version,
   char * pDbAlias,
   unsigned short CallerAction,
   char * pStopTime,
   char * pUserName,
   char * pPassword,
   char * pOverflowLogPath,
   unsigned short NumChngLgOvrflw,
   struct sqlurf_newlogpath * pChngLogOvrflw,
   unsigned short ConnectMode,
   struct sqlu_tablespace_bkrst_list * pTablespaceList,
   short AllNodeFlag,
   short NumNodes,
   SQL_PDB_NODE_TYPE * pNodeList,
   short NumNodeInfo,
   unsigned short DlMode,             /* NOTE: This parameter is no longer used */
                                      /*       for the DB2 Data Links Manager. */
   char * pReportFile,                /* NOTE: This parameter is no longer used */
                                      /*       for the DB2 Data Links Manager. */
   char * pDroppedTblID,
   char * pExportDir
}
/* ... */
```

API Parameters

pRfwdInput
Input. A pointer to the *rfwd_input* structure. For more information about this structure, see "RFWD-INPUT" on page 427.

pRfwdOutput
Output. A pointer to the *rfwd_output* structure. For more information about this structure, see "RFWD-OUTPUT" on page 430.

DbAliasLen
Input. A 2-byte unsigned integer representing the length in bytes of the database alias.

StopTimeLen
Input. A 2-byte unsigned integer representing the length in bytes of the stop time parameter. Set to zero if no stop time is provided.

UserNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the user name. Set to zero if no user name is provided.

PasswordLen
Input. A 2-byte unsigned integer representing the length in bytes of the password. Set to zero if no password is provided.

OverflowLogPathLen
Input. A 2-byte unsigned integer representing the length in bytes of the overflow log path. Set to zero if no overflow log path is provided.

ReportFileLen
Input. This parameter is not currently used, and should be set to zero.

Version
Input. The version ID of the rollforward parameters. It is defined as SQLUM_RFWD_VERSION.

pDbAlias
Input. A string containing the database alias. This is the alias that is cataloged in the system database directory.

CallerAction
Input. Specifies action to be taken. Valid values (defined in `sqlutil`) are:

SQLUM_ROLLFWD
Rollforward to the point in time specified by *pPointInTime*. For database rollforward, the database is left in *rollforward-pending* state. For table space rollforward to a point in time, the table spaces are left in *rollforward-in-progress* state.

SQLUM_STOP
End roll-forward recovery. No new log records are processed and uncommitted transactions are backed out. The *rollforward-pending* state of the database or table spaces is turned off. Synonym is SQLUM_COMPLETE.

SQLUM_ROLLFWD_STOP
Rollforward to the point in time specified by *pPointInTime*, and end roll-forward recovery. The *rollforward-pending* state of

the database or table spaces is turned off. Synonym is SQLUM_ROLLFWD_COMPLETE.

SQLUM_QUERY
Query values for *pNextArcFileName*, *pFirstDelArcFileName*, *pLastDelArcFileName*, and *pLastCommitTime*. Return database status and a node number.

SQLUM_PARM_CHECK
Validate parameters without performing the roll forward.

SQLUM_CANCEL
Cancel the rollforward operation that is currently running. The database or table space are put in recovery pending state.

Note: This option cannot be used while the rollforward is actually running. It can be used if the rollforward is paused (that is, waiting for a STOP), or if a system failure occurred during the rollforward. It should be used with caution.

Rolling databases forward may require a load recovery using tape devices. The rollforward API will return with a warning message if user intervention on a device is required. The API can be called again with one of the following three caller actions:

SQLUM_LOADREC_CONTINUE
Continue using the device that generated the warning message (for example, when a new tape has been mounted).

SQLUM_LOADREC_DEVICE_TERMINATE
Stop using the device that generated the warning message (for example, when there are no more tapes).

SQLUM_LOADREC_TERMINATE
Terminate all devices being used by load recovery.

pStopTime
Input. A character string containing a time stamp in ISO format. Database recovery will stop when this time stamp is exceeded. Specify SQLUM_INFINITY_TIMESTAMP to roll forward as far as possible. May be NULL for `SQLUM_QUERY`, `SQLUM_PARM_CHECK`, and any of the load recovery (`SQLUM_LOADREC_`*xxx*) caller actions.

pUserName
Input. A string containing the user name of the application. May be NULL.

pPassword
Input. A string containing the password of the supplied user name (if any). May be NULL.

pOverflowLogPath
Input. This parameter is used to specify an alternate log path to be used. In addition to the active log files, archived log files need to be moved (by the user) into the *logpath* (see "sqlfxdb - Get Database Configuration" on page 275) before they can be used by this utility. This can be a problem if the user does not have sufficient space in the *logpath*. The overflow log path is provided for this reason. During roll-forward recovery, the required log files are searched, first in the *logpath*, and then in the overflow log path. The log files needed for table space roll-forward recovery can be brought into either the *logpath* or the overflow log path. If the caller does not specify an overflow log path, the default value is the *logpath*. In a multi-node environment, the overflow log path must be a valid, fully qualified path; the default path is the default overflow log path for each node. In a single-node environment, the overflow log path can be relative if the server is local.

NumChngLgOvrflw
MPP only. The number of changed overflow log paths. These new log paths override the default overflow log path for the specified node only.

pChngLogOvrflw
MPP only. A pointer to a structure containing the fully qualified names of changed overflow log paths. These new log paths override the default overflow log path for the specified node only.

ConnectMode
Input. Valid values (defined in `sqlutil`) are:

SQLUM_OFFLINE
Offline roll forward. This value must be specified for database roll-forward recovery.

SQLUM_ONLINE
Online roll forward.

pTablespaceList
Input. A pointer to a structure containing the names of the table spaces to be rolled forward to the end-of-logs or to a specific point in time. If not specified, the table spaces needing rollforward will be selected.

AllNodeFlag
MPP only. Input. Indicates whether the rollforward operation is to be applied to all nodes defined in `db2nodes.cfg`. Valid values are:

SQLURF_NODE_LIST
Apply to nodes in a node list that is passed in *pNodeList*.

SQLURF_ALL_NODES
Apply to all nodes. *pNodeList* should be NULL. This is the default value.

SQLURF_ALL_EXCEPT
Apply to all nodes except those in a node list that is passed in *pNodeList*.

SQLURF_CAT_NODE_ONLY
Apply to the catalog node only. *pNodeList* should be NULL.

NumNodes
Input. Specifies the number of nodes in the *pNodeList* array.

pNodeList
Input. A pointer to an array of node numbers on which to perform the roll-forward recovery.

NumNodeInfo
Input. Defines the size of the output parameter *pNodeInfo*, which must be large enough to hold status information from each node that is being rolled forward. In a single-node environment, this parameter should be set to 1. The value of this parameter should be same as the number of nodes for which this API is being called.

DlMode
Input. This parameter is not currently used, and should be set to zero.

pReportFile
Input. This parameter is not currently used, and should be set to NULL.

pDroppedTblID
Input. A string containing the ID of the dropped table whose recovery is being attempted.

pExportDir
Input. The directory into which the dropped table data will be exported.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
ROLLFORWARD DATABASE database-alias [USING :value] [USER username USING password]
[rollforward_action_clause | load_recovery_action_clause]
where rollforward_action_clause stands for:
    { TO point-in-time [AND STOP] |
      {
        [TO END OF LOGS [AND STOP] | STOP | CANCEL | QUERY STATUS | PARM CHECK }
        [ON {:nodelist | ALL NODES [EXCEPT :nodelist]}]
      }
    }
    [TABLESPACE {ONLINE |:tablespacenames [ONLINE]} ]
    [OVERFLOW LOG PATH default-log-path [:logpaths]]
and load_recovery_action_clause stands for:
    LOAD RECOVERY { CONTINUE | DEVICE_TERMINATE | TERMINATE }
```

REXX API Parameters

database-alias
Alias of the database to be rolled forward.

value A compound REXX host variable containing the output values. In the following, XXX represents the host variable name:

XXX.0	Number of elements in the variable
XXX.1	The application ID
XXX.2	Number of replies received from nodes
XXX.2.1.1	First node number
XXX.2.1.2	First state information
XXX.2.1.3	First next archive file needed
XXX.2.1.4	First first archive file to be deleted
XXX.2.1.5	First last archive file to be deleted
XXX.2.1.6	First last commit time
XXX.2.2.1	Second node number
XXX.2.2.2	Second state information
XXX.2.2.3	Second next archive file needed
XXX.2.2.4	Second first archive file to be deleted
XXX.2.2.5	Second last archive file to be deleted
XXX.2.2.6	Second last commit time
XXX.2.3.*x*	and so on.

username
Identifies the user name under which the database is to be rolled forward.

password
The password used to authenticate the user name.

point-in-time
A time stamp in ISO format, *yyyy-mm-dd-hh.mm.ss.nnnnnn* (year, month, day, hour, minutes,seconds, microseconds), expressed in Coordinated Universal Time (UTC).

tablespacenames
A compound REXX host variable containing a list of table spaces to be rolled forward. In the following, XXX is the name of the host variable:

XXX.0	Number of table spaces to be rolled forward
XXX.1	First table space name
XXX.2	Second table space name
XXX.x	and so on.

default-log-path
The default overflow log path to be searched for archived logs during recovery

logpaths
A compound REXX host variable containing a list of alternate log paths to be searched for archived logs during recovery. In the following, XXX is the name of the host variable:

XXX.0	Number of changed overflow log paths
XXX.1.1	First node
XXX.1.2	First overflow log path
XXX.2.1	Second node
XXX.2.2	Second overflow log path
XXX.3.1	Third node
XXX.3.2	Third overflow log path
XXX.x.1	and so on.

nodelist
A compound REXX host variable containing a list of nodes. In the following, XXX is the name of the host variable:

XXX.0	Number of nodes
XXX.1	First node

XXX.2	Second node
XXX.x	and so on.

Sample Programs

C	\sqllib\samples\c\backrest.c
COBOL	\sqllib\samples\cobol\backrest.cbl

Usage Notes

The database manager uses the information stored in the archived and the active log files to reconstruct the transactions performed on the database since its last backup.

The action performed when this API is called depends on the *rollforward_pending* flag of the database prior to the call. This can be queried using "sqlfxdb - Get Database Configuration" on page 275. The *rollforward_pending* flag is set to `DATABASE` if the database is in roll-forward pending state. It is set to `TABLESPACE` if one or more table spaces are in `SQLB_ROLLFORWARD_PENDING` or `SQLB_ROLLFORWARD_IN_PROGRESS` state. The *rollforward_pending* flag is set to `NO` if neither the database nor any of the table spaces needs to be rolled forward.

If the database is in roll-forward pending state when this API is called, the database will be rolled forward. Table spaces are returned to normal state after a successful database roll-forward, unless an abnormal state causes one or more table spaces to go offline. If the *rollforward_pending* flag is set to `TABLESPACE`, only those table spaces that are in roll-forward pending state, or those table spaces requested by name, will be rolled forward.

Note: If table space rollforward terminates abnormally, table spaces that were being rolled forward will be put in `SQLB_ROLLFORWARD_IN_PROGRESS` state. In the next invocation of ROLLFORWARD DATABASE, only those table spaces in `SQLB_ROLLFORWARD_IN_PROGRESS` state will be processed. If the set of selected table space names does not include all table spaces that are in `SQLB_ROLLFORWARD_IN_PROGRESS` state, the table spaces that are not required will be put into `SQLB_RESTORE_PENDING` state.

If the database is not in roll-forward pending state and no point in time is specified, any table spaces that are in rollforward-in-progress state will be rolled forward to the end of logs. If no table spaces are in rollforward-in-progress state, any table spaces that are in rollforward pending state will be rolled forward to the end of logs.

This API reads the log files, beginning with the log file that is matched with the backup image. The name of this log file can be determined by calling this API with a caller action of SQLUM_QUERY before rolling forward any log files.

The transactions contained in the log files are reapplied to the database. The log is processed as far forward in time as information is available, or until the time specified by the stop time parameter.

Recovery stops when any one of the following events occurs:

- No more log files are found
- A time stamp in the log file exceeds the completion time stamp specified by the stop time parameter
- An error occurs while reading the log file.

Some transactions might not be recovered. The value returned in *pLastCommitTime* indicates the time stamp of the last committed transaction that was applied to the database.

If the need for database recovery was caused by application or human error, the user may want to provide a time stamp value in *pStopTime*, indicating that recovery should be stopped before the time of the error. This applies only to full database roll-forward recovery, and to table space rollforward to a point in time. It also permits recovery to be stopped before a log read error occurs, determined during an earlier failed attempt to recover.

When the *rollforward_recovery* flag is set to DATABASE, the database is not available for use until roll-forward recovery is terminated. Termination is accomplished by calling the API with a caller action of SQLUM_STOP or SQLUM_ROLLFORWARD_STOP to bring the database out of roll-forward pending state. If the *rollforward_recovery* flag is TABLESPACE, the database is available for use. However, the table spaces in SQLB_ROLLFORWARD_PENDING and SQLB_ROLLFORWARD_IN_PROGRESS states will not be available until the API is called to perform table space roll-forward recovery. If rolling forward table spaces to a point in time, the table spaces are placed in backup pending state after a successful rollforward.

Rolling databases forward may involve prerequisites and restrictions that are beyond the scope of this manual. For more detailed information, see the *Administration Guide*.

See Also

"sqluload - Load" on page 345

"sqlurestore - Restore Database" on page 381.

sqlustat - Runstats

Updates statistics about the characteristics of a table and any associated indexes. These characteristics include, among many others, number of records, number of pages, and average record length. The optimizer uses these statistics when determining access paths to the data.

This utility should be called when a table has had many updates, after reorganizing a table, or after creating a new index.

Statistics are collected based on the table partition that is resident on the node where the API executes. Global table statistics are derived by multiplying the values obtained at a node by the number of nodes on which the table is completely stored. The global statistics are stored in the catalog tables.

The node from which the API is called does not have to contain a partition for the table:

- If the API is called from a node that contains a partition for the table, the utility executes at this node.
- If the API is called from a node that does not contain a table partition, the request is sent to the first node in the nodegroup that holds a partition for the table. The utility then executes at this node.

Scope

This API can be called from any node in the `db2nodes.cfg` file. It can be used to update the catalogs on the catalog node.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- CONTROL privilege on the table.

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Run Statistics */
/* ... */
SQL_API_RC SQL_API_FN
  sqlustat (
    _SQLOLDCHAR * pTableName,
    unsigned short NumIndexes,
    _SQLOLDCHAR ** ppIndexList,
    unsigned char StatsOption,
    unsigned char ShareLevel,
    struct sqlca * pSqlca);
/* ... */
```

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Run Statistics */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgstat (
    unsigned short TableNameLen,
    unsigned short NumIndexes,
    unsigned char StatsOption,
    unsigned char ShareLevel,
    unsigned short * pIndexLens,
    struct sqlca * pSqlca,
    _SQLOLDCHAR ** ppIndexList,
    _SQLOLDCHAR * pTableName);
/* ... */
```

API Parameters

TableNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the table name.

NumIndexes
Input. The number of indexes specified in this call. This value is used with the *StatsOption* parameter. Valid values are:

0 All the indexes are to be calculated.

n The number of indexes contained in the index list. The names of the indexes to be calculated are specified in *ppIndexList*.

StatsOption
Input. Statistical option, indicating which calculations are to be performed. Valid values (defined in `sqlutil`) are:

SQL_STATS_TABLE
Table only.

SQL_STATS_EXTTABLE_ONLY
Table with extended (distribution) statistics.

SQL_STATS_BOTH
Both table and indexes.

SQL_STATS_EXTTTABLE_INDEX
Both table (with distribution statistics) and basic indexes.

SQL_STATS_INDEX
Indexes only.

SQL_STATS_EXTINDEX_ONLY
Extended statistics for indexes only.

SQL_STATS_EXTINDEX_TABLE
Extended statistics for indexes and basic table statistics.

SQL_STATS_ALL
Extended statistics for indexes and table statistics with distribution statistics.

ShareLevel
Input. Specifies how the statistics are to be gathered with respect to other users. Valid values (defined in `sqlutil`) are:

SQL_STATS_REF
Allows others to have read-only access while the statistics are being gathered.

SQL_STATS_CHG
Allows others to have read and write access while the statistics are being gathered.

pIndexLens
Input. An array of 2-byte unsigned integers representing the length in bytes of each of the index names in the index list.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

ppIndexList
Input. An array of strings. Each string contains one fully qualified index name.

pTableName
Input. The table on which to update statistics. Can be an alias, except in the case of down-level servers, when the fully qualified table name must be used.

For row types, *pTableName* must be the name of the hierarchy's root table.

REXX API Syntax

```
RUNSTATS ON TABLE tname
[WITH :statsopt INDEXES {ALL | USING :value}]
[SHRLEVEL {REFERENCE|CHANGE}]
```

REXX API Parameters

tname The fully qualified name of the table on which statistics are to be gathered.

statsopt
A host variable containing a statistical option, indicating which calculations are to be performed. Valid values are:

- **T** Indicates that basic statistics are to be updated for the specified table only. This is the default
- **D** Indicates that extended (distribution) statistics are to be updated for the specified table
- **B** Indicates that basic statistics are to be updated for both the specified table and the specified indexes
- **E** Indicates that extended statistics are to be updated for the specified table, and that basic statistics are to be updated for the indexes
- **I** Indicates that basic statistics are to be updated for the specified indexes only
- **X** Indicates that extended statistics are to be updated for the specified indexes only
- **Y** Indicates that basic statistics are to be updated for the specified table, and that extended statistics are to be updated for the indexes
- **A** Indicates that extended statistics are to be updated for both the specified table and the specified indexes.

value A compound REXX host variable containing the names of the indexes for which statistics are to be generated. In the following, XXX represents the host variable name:

- **XXX.0** The number of indexes specified in this call
- **XXX.1** First fully qualified index name
- **XXX.2** Second fully qualified index name
- **XXX.3** and so on.

REFERENCE
Other users can have read-only access while updates are being made.

CHANGE
Other users can have read or write access while updates are being made. This is the default.

Sample Programs

C	\sqllib\samples\c\dbstat.sqc
COBOL	\sqllib\samples\cobol\dbstat.sqb

Usage Notes

This API is not supported for declared temporary tables.

Use RUNSTATS to update statistics:

- On tables that have been modified many times (for example, if a large number of updates have been made, or if a significant amount of data has been inserted or deleted)
- On tables that have been reorganized
- When a new index has been created.

After statistics have been updated, new access paths to the table can be created by rebinding the packages using "sqlabndx - Bind" on page 85.

If index statistics are requested, and statistics have never been run on the table containing the index, statistics on both the table and indexes are calculated.

After calling this API, the application should issue a COMMIT to release the locks.

To allow new access plans to be generated, the packages that reference the target table must be rebound after calling this API.

Statistics are collected based on the table data that is located on the database partition where the API executes. Global table statistics for an entire partitioned table are derived by multiplying the values obtained at a database partition by the number of database partitions in the nodegroup over which the table is partitioned. The global statistics are stored in the catalog tables.

The database partition from which the API is called does not have to contain a partition for the table:

- If the API is called from a database partition that contains a partition for the table, the utility executes at this database partition.

- If the API is called from a database partition that does not contain a table partition, the request is sent to the first database partition in the nodegroup that holds a partition for the table. The utility then executes at this database partition.

If inconsistencies are found when running a portion of this API (resulting from activity on the table since the API was last called), a warning message is returned. For example, if table distribution statistics were gathered on the first call, and only index statistics are gathered on the second call, then if inconsistencies are detected as a result of activity on the table, the table distribution statistics are dropped. At this point, it is recommended to call the API again to refresh the table distribution statistics.

See Also

"REORGCHK" in the *Command Reference*

"sqlfxdb - Get Database Configuration" on page 275

"sqlureot - Reorganize Table" on page 377.

sqluvqdp - Quiesce Tablespaces for Table

Quiesces table spaces for a table. There are three valid quiesce modes: share, intent to update, and exclusive. There are three possible table space states resulting from the quiesce function: QUIESCED SHARE, QUIESCED UPDATE, and QUIESCED EXCLUSIVE.

Scope

In a single-node environment, this API quiesces all table spaces involved in a load operation in exclusive mode for the duration of the load. In an MPP environment, this API acts locally on a node. It quiesces only that portion of table spaces belonging to the node on which the load is performed.

Authorization

One of the following:

- *sysadm*
- *sysctrl*
- *sysmaint*
- *dbadm*
- *load*

Required Connection

Database

API Include File

sqlutil.h

C API Syntax

```
/* File: sqlutil.h */
/* API: Quiesce Tablespaces for Table */
/* ... */
SQL_API_RC SQL_API_FN
  sqluvqdp (
    char * pTableName,
    sqlint32 QuiesceMode,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

sqluvqdp - Quiesce Tablespaces for Table

Generic API Syntax

```
/* File: sqlutil.h */
/* API: Quiesce Tablespaces for Table */
/* ... */
SQL_API_RC SQL_API_FN
  sqlgvqdp (
    unsigned short TableNameLen,
    char * pTableName,
    sqlint32 QuiesceMode,
    void * pReserved,
    struct sqlca * pSqlca);
/* ... */
```

API Parameters

TableNameLen
Input. A 2-byte unsigned integer representing the length in bytes of the table name.

pTableName
Input. A string containing the table name as used in the system catalog. This may be a two-part name with the *schema* and the table name separated by a period (.). If the *schema* is not provided, the CURRENT SCHEMA will be used. The table cannot be a system catalog table. This field is mandatory.

QuiesceMode
Input. Specifies the quiesce mode. Valid values (defined in `sqlutil`) are:

SQLU_QUIESCEMODE_SHARE
For share mode

SQLU_QUIESCEMODE_INTENT_UPDATE
For intent to update mode

SQLU_QUIESCEMODE_EXCLUSIVE
For exclusive mode

SQLU_QUIESCEMODE_RESET
To reset the state of the table spaces to normal if either of the following is true:

- The caller owns the quiesce
- The caller who sets the quiesce disconnects, creating a ″phantom quiesce″

SQLU_QUIESCEMODE_RESET_OWNED
To reset the state of the table spaces to normal if the caller owns the quiesce.

This field is mandatory.

pReserved
Reserved for future use.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

REXX API Syntax

```
QUIESCE TABLESPACES FOR TABLE table_name
{SHARE | INTENT TO UPDATE | EXCLUSIVE | RESET}
```

REXX API Parameters

table_name
Name of the table as used in the system catalog. This may be a two-part name with the *schema* and the table name separated by a period (.). If the *schema* is not provided, the CURRENT SCHEMA will be used.

Sample Programs

C	\sqllib\samples\c\tload.sqc
COBOL	\sqllib\samples\cobol\tload.sqb
REXX	\sqllib\samples\rexx\quitab.cmd

Usage Notes

This API is not supported for declared temporary tables.

When the quiesce share request is received, the transaction requests intent share locks for the table spaces and a share lock for the table. When the transaction obtains the locks, the state of the table spaces is changed to QUIESCED SHARE. The state is granted to the quiescer only if there is no conflicting state held by other users. The state of the table spaces is recorded in the table space table, along with the authorization ID and the database agent ID of the quiescer, so that the state is persistent.

The table cannot be changed while the table spaces for the table are in QUIESCED SHARE state. Other share mode requests to the table and table spaces will be allowed. When the transaction commits or rolls back, the locks are released, but the table spaces for the table remain in QUIESCED SHARE state until the state is explicitly reset.

When the quiesce exclusive request is made, the transaction requests super exclusive locks on the table spaces, and a super exclusive lock on the table. When the transaction obtains the locks, the state of the table spaces changes to

QUIESCED EXCLUSIVE. The state of the table spaces, along with the authorization ID and the database agent ID of the quiescer, are recorded in the table space table. Since the table spaces are held in super exclusive mode, no other access to the table spaces is allowed. The user who invokes the quiesce function (the quiescer), however, has exclusive access to the table and the table spaces.

When a quiesce update request is made, the table spaces are locked in intent exclusive (IX) mode, and the table is locked in update (U) mode. The state of the table spaces with the quiescer is recorded in the table space table.

There is a limit of five quiescers on a table space at any given time. Since QUIESCED EXCLUSIVE is incompatible with any other state, and QUIESCED UPDATE is incompatible with another QUIESCED UPDATE, the five quiescer limit, if reached, must have at least four QUIESCED SHARE and at most one QUIESCED UPDATE.

A quiescer can upgrade the state of a table space from a less restrictive state to a more restrictive one (for example, S to U, or U to X). If a user requests a state lower than one that is already held, the original state is returned. States are not downgraded.

The quiesced state of a table space must be reset explicitly by using SQLU_QUIESCEMODE_RESET.

See Also

"sqluload - Load" on page 345.

Chapter 2. Additional REXX APIs

This chapter describes DB2 application programming interfaces that are only supported in the REXX programming language.

Change Isolation Level

Changes the way that DB2 isolates data from other processes while a database is being accessed.

Authorization

None

Required Connection

None

REXX API Syntax

```
CHANGE SQLISL TO {RR|CS|UR|RS|NC}
```

REXX API Parameters

RR Repeatable read.

CS Cursor stability. This is the default.

UR Uncommitted read.

RS Read stability.

NC No commit.

Sample Programs

REXX \sqllib\samples\rexx\chgisl.cmd

Chapter 3. Data Structures

This chapter describes the data structures used to access the database manager. The following data structures are provided:

db2HistData

This structure is used to return information after a call to "db2HistoryGetEntry - Get Next Recovery History File Entry" on page 36.

Table 11. Fields in the db2HistData Structure

Field Name	Data Type	Description
ioHistDataID	char(8)	An eight-byte structure identifier and "eye-catcher" for storage dumps. The only valid value is `"SQLUHINF"`. No symbolic definition for this strings exists.
oObjectPart	db2Char	The first 14 characters are a time stamp with format *yyyymmddhhnnss*, indicating when the operation was begun. The next 3 characters are a sequence number. Each backup operation can result in multiple entries in this file when the backup image is saved in multiple files or on multiple tapes. The sequence number allows multiple locations to be specified. Restore and load operations have only a single entry in this file, which corresponds to sequence number '001' of the corresponding backup. The time stamp, combined with the sequence number, must be unique.
oEndTime	db2Char	A time stamp with format *yyyymmddhhnnss*, indicating when the operation was completed.
oFirstLog	db2Char	The earliest log file ID (ranging from S0000000 to S9999999): • Required to apply roll forward recovery for an online backup • Required to apply roll forward recovery for an offline backup • Applied after restoring a full database or table space level backup that was current when the load started.
oLastLog	db2Char	The latest log file ID (ranging from S0000000 to S9999999): • Required to apply roll forward recovery for an online backup • Required to apply roll forward recovery to the current point in time for an offline backup • Applied after restoring a full database or table space level backup that was current when the load operation finished (will be the same as *oFirstLog* if roll forward recovery is not applied).
oID	db2Char	Unique backup or table identifier.
oTableQualifier	db2Char	Table qualifier.

Table 11. Fields in the db2HistData Structure (continued)

Field Name	Data Type	Description
oTableName	db2Char	Table name.
oLocation	db2Char	For backups and load copies, this field indicates where the data has been saved. For operations that require multiple entries in the file, the sequence number defined by *oObjectPart* identifies which part of the backup is found in the specified location. For restore and load operations, the location always identifies where the first part of the data restored or loaded (corresponding to sequence '001' for multi-part backups) has been saved. The data in *oLocation* is interpreted differently, depending on *oDeviceType*: • For disk or diskette (`D` or `K`), a fully qualified file name • For tape (`T`), a volume label • For TSM (`A`), the server name • For user exit or other (`U` or `0`), free form text.
oComment	db2Char	Free form text comment.
oCommandText	db2Char	Command text, or DDL.
oLastLSN	SQLU_LSN	Last log sequence number.
oEID	Structure	Unique entry identifier.
poEventSQLCA	Structure	Result *sqlca* of the recorded event. For information about the *sqlca* structure, see "SQLCA" on page 450.
poTablespace	db2Char	A list of table space names.
ioNumTablespaces	db2Uint32	Number of entries in the *poTablespace* list. Each table space backup contains one or more table spaces. Each table space restore operation replaces one or more table spaces. If this field is not zero (indicating a table space level backup or restore), the next lines in this file contain the name of the table space backed up or restored, represented by an 18-character string. One table space name appears on each line.
oOperation	char	Type of event: `B` for backup, `C` for copy, `D` for dropped table, `F` for roll forward, `G` for reorganize table, `L` for load, `Q` for quiesce, `R` for restore, `S` for run statistics, `T` for alter table space, and `U` for future use.
oObject	char	Granularity of the operation: `D` for full database, `P` for table space, and `T` for table.

Table 11. Fields in the db2HistData Structure (continued)

Field Name	Data Type	Description
oOptype	char	Operation type: `C` for alter tablespace (add containers), `E` for end of log, `F` for offline, `I` for insert (load), `N` for online, `P` for point in time, `R` for alter tablespace (rebalance), `S` for quiesce share, `U` for quiesce update, `X` for quiesce exclusive, and `Z` for quiesce reset.
oStatus	char	Entry status: `D` for deleted (future use), `E` for expired, `I` for inactive, `N` for not yet committed, and `Y` for committed or active.
oDeviceType	char	Device type. This field determines how the *oLocation* field is interpreted: `A` for TSM, `C` for client, `D` for disk, `K` for diskette, `L` for local, `O` for other (for other vendor device support), `P` for pipe, `S` for server, `T` for tape, and `U` for user exit.

Table 12. Fields in the db2Char Structure

Field Name	Data Type	Description
pioData	char	A pointer to a character data buffer. If NULL, no data will be returned.
iLength	db2Uint32	Input. The size of the pioData buffer.
oLength	db2Uint32	Output. The number of valid characters of data in the pioData buffer.

Table 13. Fields in the db2HistoryEID Structure

Field Name	Data Type	Description
ioNode	SQL_PDB_NODE_TYPE	Node number.
ioHID	db2Uint32	Local history file entry ID.

Language Syntax

C Structure

```
/* File: db2ApiDf.h */
/* ... */
typedef SQL_STRUCTURE db2HistoryData
{
  char ioHistDataID[8];
  db2Char oObjectPart;
  db2Char oEndTime;
  db2Char oFirstLog;
  db2Char oLastLog;
  db2Char oID;
  db2Char oTableQualifier;
  db2Char oTableName;
  db2Char oLocation;
  db2Char oComment;
  db2Char oCommandText;
  SQLU_LSN oLastLSN;
  db2HistoryEID oEID;
  struct sqlca * poEventSQLCA;
  db2Char * poTablespace;
  db2Uint32 ioNumTablespaces;
  char oOperation;
  char oObject;
  char oOptype;
  char oStatus;
  char oDeviceType
} db2HistoryData;

typedef SQL_STRUCTURE db2Char
{
  char * pioData;
  db2Uint32 ioLength
} db2Char;

typedef SQL_STRUCTURE db2HistoryEID
{
  SQL_PDB_NODE_TYPE ioNode;
  db2Uint32 ioHID
} db2HistoryEID;
/* ... */
```

RFWD-INPUT

This structure is used to pass information to "sqluroll - Rollforward Database" on page 397.

Table 14. Fields in the RFWD-INPUT Structure

Field Name	Data Type	Description
VERSION	sqluint32	Rollforward version.
PDBALIAS	Pointer	Database alias.
CALLERACTION	UNSIGNED SHORT	Action.
PSTOPTIME	Pointer	Stop time.
PUSERNAME	Pointer	User name.
PPASSWORD	Pointer	Password.
POVERFLOWLOGPATH	Pointer	Overflow log path.
NUMCHNGLGOVRFLW	UNSIGNED SHORT	Number of changed overflow log paths (MPP only).
PCHNGLOGOVRFLW	Structure	Changed overflow log paths (MPP only).
CONNECTMODE	UNSIGNED SHORT	Connect mode.
PTABLESPACELIST	Structure	A pointer to a list of table space names. For information about this structure, see "SQLU-TABLESPACE-BKRST-LIST" on page 523.
ALLNODEFLAG	SHORT	All node flag.
NUMNODES	SHORT	Size of the node list.
PNODELIST	Pointer	List of node numbers.
NUMNODEINFO	SHORT	Size of *pNodeInfo* in "RFWD-OUTPUT" on page 430.
DLMODE	UNSIGNED SHORT	This parameter is not currently used.
PREPORTFILE	Pointer	This parameter is not currently used.
PDROPPEDTBLID	Pointer	A string containing the ID of the dropped table whose recovery is being attempted.
PEXPORTDIR	Pointer	The directory into which the dropped table data will be exported.
NODENUM	SQL_PDB_NODE_TYPE	Node number.
PATHLEN	UNSIGNED SHORT	Length of the new log path.
LOGPATH	CHAR(255)	New overflow log path.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: RFWD-INPUT */
/* ... */
SQL_STRUCTURE rfwd_input
{
  sqluint32              version;
  char                   *pDbAlias;
  unsigned short         CallerAction;
  char                   *pStopTime;
  char                   *pUserName;
  char                   *pPassword;
  char                   *pOverflowLogPath;
  unsigned short         NumChngLgOvrflw;
  struct sqlurf_newlogpath *pChngLogOvrflw;
  unsigned short         ConnectMode;
  struct sqlu_tablespace_bkrst_list *pTablespaceList;
  short                  AllNodeFlag;
  short                  NumNodes;
  SQL_PDB_NODE_TYPE      *pNodeList;
  short                  NumNodeInfo;
  unsigned short         DlMode;         /* This parameter is not currently used. */
  char                   *pReportFile;   /* This parameter is not currently used. */
  char                   *pDroppedTblID;
  char                   *pExportDir;
};
/* ... */

/* File: sqlutil.h */
/* Structure: SQLURF-NEWLOGPATH */
/* ... */
SQL_STRUCTURE sqlurf_newlogpath
{
  SQL_PDB_NODE_TYPE      nodenum;
  unsigned short         pathlen;
  char                   logpath[SQL_LOGPATH_SZ+SQL_LOGFILE_NAME_SZ+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-RFWD-INPUT.
    05 SQL-VERSION            PIC 9(9) COMP-5.
    05 SQL-DBALIAS            USAGE IS POINTER.
    05 SQL-CALLERACTION       PIC 9(4) COMP-5.
    05 FILLER                 PIC X(2).
    05 SQL-STOPTIME           USAGE IS POINTER.
    05 SQL-USERNAME           USAGE IS POINTER.
    05 SQL-PASSWORD           USAGE IS POINTER.
    05 SQL-OVERFLOWLOGPATH    USAGE IS POINTER.
    05 SQL-NUMCHANGE          PIC 9(4) COMP-5.
    05 FILLER                 PIC X(2).
    05 SQL-P-CHNG-LOG-OVRFLW  USAGE IS POINTER.
    05 SQL-CONNECTMODE        PIC 9(4) COMP-5.
    05 FILLER                 PIC X(2).
    05 SQL-P-TABLESPACE-LIST  USAGE IS POINTER.
    05 SQL-ALLNODEFLAG        PIC S9(4) COMP-5.
    05 SQL-NUMNODES           PIC S9(4) COMP-5.
    05 SQL-NODELIST           USAGE IS POINTER.
    05 SQL-NUMNODEINFO        PIC S9(4) COMP-5.
    05 SQL-DLMODE             PIC 9(4) COMP-5.  * This parameter is not
                                                *   currently used.
    05 SQL-REPORTFILE         USAGE IS POINTER. * This parameter is not
                                                *   currently used.
    05 SQL-DROPPEDTBLID       USAGE IS POINTER.
    05 SQL-EXPORTDIR       USAGE IS POINTER.
*

* File: sqlutil.cbl
01 SQLURF-NEWLOGPATH.
    05 SQL-NODENUM            PIC S9(4) COMP-5.
    05 SQL-PATHLEN            PIC 9(4) COMP-5.
    05 SQL-LOGPATH            PIC X(254).
    05 FILLER                 PIC X.
    05 FILLER                 PIC X(1).
*
```

RFWD-OUTPUT

This structure is used to pass information from "sqluroll - Rollforward Database" on page 397.

Table 15. Fields in the RFWD-OUTPUT Structure

Field Name	Data Type	Description
PAPPLICATIONID	Pointer	The address of a buffer of length `SQLU_APPLID_LEN+1` (defined in `sqlutil`) to hold an application identifier returned from the API. This identifier can be used with the database system monitor APIs to monitor some aspects of the application. If this information is not of interest, supply the NULL pointer. In a multi-node environment, returns only the application identifier for the catalog node.
PNUMREPLIES	Pointer	Number of node replies received. Each node that replies fills in an *sqlurf_info* structure in *pNodeInfo*. In a single-node environment, the value of this parameter is 1.
PNODEINFO	Structure	Node reply information. A user defined array of *NumNodeInfo sqlurf_info* structures.

Table 16. Fields in the SQLURF-INFO Structure

Field Name	Data Type	Description
NODENUM	SQL_PDB_NODE_TYPE	Node number.
STATE	LONG	State information.
NEXTARCLOG	UNSIGNED CHAR(13)	A 12-byte buffer to hold the returned name of the next archived log file required. If a caller action other than `SQLUM_QUERY` is supplied, the value returned in this field indicates that an error occurred when accessing the file. Possible causes are: • The file was not found in the database log directory, nor on the path specified by the overflow log path parameter • The user exit program failed to return the archived file.

Table 16. Fields in the SQLURF-INFO Structure (continued)

Field Name	Data Type	Description
FIRSTARCDEL	UNSIGNED CHAR(13)	A 12-byte buffer to hold the returned name of the first archived log file no longer needed for recovery. This file, and all files up to and including *lastarcdel*, can be moved to make room on the disk. For example, if the values returned in *firstarcdel* and *lastarcdel* are `S0000001.LOG` and `S0000005.LOG`, the following log files can be moved: • `S0000001.LOG` • `S0000002.LOG` • `S0000003.LOG` • `S0000004.LOG` • `S0000005.LOG`
LASTARCDEL	UNSIGNED CHAR(13)	A 12-byte buffer to hold the returned name of the last archived log file that can be removed from the database log directory.
LASTCOMMIT	UNSIGNED CHAR(27)	A 26-character string containing a time stamp in ISO format. This value represents the time stamp of the last committed transaction after the rollforward operation terminates.

Possible values for *STATE* (defined in `sqlutil`) are:

SQLURFQ_NOT_AVAILABLE
Could not connect to the node.

SQLURFQ_NOT_RFW_PENDING
Database is not rollforward pending.

SQLURFQ_DB_RFW_PENDING
Database is rollforward pending.

SQLURFQ_TBL_RFW_PENDING
Table space is rollforward pending.

SQLURFQ_DB_RFW_IN_PROGRESS
Database rollforward in progress.

SQLURFQ_TBL_RFW_IN_PROGRESS
Table space rollforward in progress.

SQLURFQ_DB_RFW_STOPPING
Database rollforward was interrupted while processing a STOP request.

SQLURFQ_TBL_RFW_STOPPING
Table space rollforward was interrupted while processing a STOP request.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: RFWD-OUTPUT */
/* ... */
SQL_STRUCTURE rfwd_output
{
  char            *pApplicationId;
  long            *pNumReplies;
  struct sqlurf_info *pNodeInfo;
};
/* ... */

/* File: sqlutil.h */
/* Structure: SQLURF-INFO */
/* ... */
SQL_STRUCTURE sqlurf_info
{
  SQL_PDB_NODE_TYPE nodenum;
  long            state;
  unsigned char   nextarclog[SQLUM_ARCHIVE_FILE_LEN+1];
  unsigned char   firstarcdel[SQLUM_ARCHIVE_FILE_LEN+1];
  unsigned char   lastarcdel[SQLUM_ARCHIVE_FILE_LEN+1];
  unsigned char   lastcommit[SQLUM_TIMESTAMP_LEN+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-RFWD-OUTPUT.
    05 SQL-APPLID             USAGE IS POINTER.
    05 SQL-NUMREPLIES         USAGE IS POINTER.
    05 SQL-P-NODE-INFO        USAGE IS POINTER.
*
```

```
* File: sqlutil.cbl
01 SQLURF-INFO.
    05 SQL-NODENUM           PIC S9(4) COMP-5.
    05 FILLER                PIC X(2).
    05 SQL-STATE             PIC S9(9) COMP-5.
    05 SQL-NEXTARCLOG        PIC X(12).
    05 FILLER                PIC X.
    05 SQL-FIRSTARCDEL       PIC X(12).
    05 FILLER                PIC X.
    05 SQL-LASTARCDEL        PIC X(12).
    05 FILLER                PIC X.
    05 SQL-LASTCOMMIT        PIC X(26).
    05 FILLER                PIC X.
    05 FILLER                PIC X(2).
*
```

SQL-AUTHORIZATIONS

This structure is used to return information after a call to "sqluadau - Get Authorizations" on page 287. The data type of all fields is SMALLINT. The first half of the following table contains authorities granted directly to a user. The second half of the table contains authorities granted to the groups to which a user belongs.

Table 17. Fields in the SQL-AUTHORIZATIONS Structure

Field Name	Description
SQL_AUTHORIZATIONS_LEN	Size of structure.
SQL_SYSADM_AUTH	SYSADM authority.
SQL_SYSCTRL_AUTH	SYSCTRL authority.
SQL_SYSMAINT_AUTH	SYSMAINT authority.
SQL_DBADM_AUTH	DBADM authority.
SQL_CREATETAB_AUTH	CREATETAB authority.
SQL_CREATET_NOT_FENC_AUTH	CREATE_NOT_FENCED authority.
SQL_BINDADD_AUTH	BINDADD authority.
SQL_CONNECT_AUTH	CONNECT authority.
SQL_IMPLICIT_SCHEMA_AUTH	IMPLICIT_SCHEMA authority.
SQL_LOAD_AUTH	LOAD authority.
SQL_SYSADM_GRP_AUTH	User belongs to a group which holds SYSADM authority.
SQL_SYSCTRL_GRP_AUTH	User belongs to a group which holds SYSCTRL authority.
SQL_SYSMAINT_GRP_AUTH	User belongs to a group which holds SYSMAINT authority.
SQL_DBADM_GRP_AUTH	User belongs to a group which holds DBADM authority.
SQL_CREATETAB_GRP_AUTH	User belongs to a group which holds CREATETAB authority.
SQL_CREATE_NON_FENC_GRP_AUTH	User belongs to a group which holds CREATE_NOT_FENCED authority.
SQL_BINDADD_GRP_AUTH	User belongs to a group which holds BINDADD authority.
SQL_CONNECT_GRP_AUTH	User belongs to a group which holds CONNECT authority.
SQL_IMPLICIT_SCHEMA_GRP_AUTH	User belongs to a group which holds IMPLICIT_SCHEMA authority.
SQL_LOAD_GRP_AUTH	User belongs to a group which holds LOAD authority.
Note: SYSADM, SYSMAINT, and SYSCTRL are only indirect authorities and cannot be granted directly to the user. They are available only through the groups to which the user belongs.	

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQL-AUTHORIZATIONS */
/* ... */
SQL_STRUCTURE sql_authorizations
{
  short           sql_authorizations_len;
  short           sql_sysadm_auth;
  short           sql_dbadm_auth;
  short           sql_createtab_auth;
  short           sql_bindadd_auth;
  short           sql_connect_auth;
  short           sql_sysadm_grp_auth;
  short           sql_dbadm_grp_auth;
  short           sql_createtab_grp_auth;
  short           sql_bindadd_grp_auth;
  short           sql_connect_grp_auth;
  short           sql_sysctrl_auth;
  short           sql_sysctrl_grp_auth;
  short           sql_sysmaint_auth;
  short           sql_sysmaint_grp_auth;
  short           sql_create_not_fenc_auth;
  short           sql_create_not_fenc_grp_auth;
  short           sql_implicit_schema_auth;
  short           sql_implicit_schema_grp_auth;
  short           sql_load_auth;
  short           sql_load_grp_auth;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-AUTHORIZATIONS.
    05 SQL-AUTHORIZATIONS-LEN PIC S9(4) COMP-5.
    05 SQL-SYSADM-AUTH        PIC S9(4) COMP-5.
    05 SQL-DBADM-AUTH         PIC S9(4) COMP-5.
    05 SQL-CREATETAB-AUTH     PIC S9(4) COMP-5.
    05 SQL-BINDADD-AUTH       PIC S9(4) COMP-5.
    05 SQL-CONNECT-AUTH       PIC S9(4) COMP-5.
    05 SQL-SYSADM-GRP-AUTH    PIC S9(4) COMP-5.
    05 SQL-DBADM-GRP-AUTH     PIC S9(4) COMP-5.
    05 SQL-CREATETAB-GRP-AUTH PIC S9(4) COMP-5.
    05 SQL-BINDADD-GRP-AUTH   PIC S9(4) COMP-5.
    05 SQL-CONNECT-GRP-AUTH   PIC S9(4) COMP-5.
    05 SQL-SYSCTRL-AUTH       PIC S9(4) COMP-5.
    05 SQL-SYSCTRL-GRP-AUTH   PIC S9(4) COMP-5.
    05 SQL-SYSMAINT-AUTH      PIC S9(4) COMP-5.
    05 SQL-SYSMAINT-GRP-AUTH  PIC S9(4) COMP-5.
    05 SQL-CREATE-NOT-FENC-AUTH PIC S9(4) COMP-5.
    05 SQL-CREATE-NOT-FENC-GRP-AUTH PIC S9(4) COMP-5.
    05 SQL-IMPLICIT-SCHEMA-AUTH PIC S9(4) COMP-5.
    05 SQL-IMPLICIT-SCHEMA-GRP-AUTH PIC S9(4) COMP-5.
    05 SQL-LOAD-AUTH PIC S9(4) COMP-5.
    05 SQL-LOAD-GRP-AUTH PIC S9(4) COMP-5.
*
```

SQL-DIR-ENTRY

This structure is used by the DCS directory APIs.

Table 18. Fields in the SQL-DIR-ENTRY Structure

Field Name	Data Type	Description
STRUCT_ID	SMALLINT	Structure identifier. Set to SQL_DCS_STR_ID (defined in sqlenv).
RELEASE	SMALLINT	Release version (assigned by the API).
CODEPAGE	SMALLINT	Code page for comment.
COMMENT	CHAR(30)	Optional description of the database.
LDB	CHAR(8)	Local name of the database; must match database alias in system database directory.
TDB	CHAR(18)	Actual name of the database.
AR	CHAR(32)	Name of the application client.
PARM	CHAR(512)	Contains transaction program prefix, transaction program name, SQLCODE mapping file name, and disconnect and security option.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQL-DIR-ENTRY */
/* ... */
SQL_STRUCTURE sql_dir_entry
{
  unsigned short         struct_id;
  unsigned short         release;
  unsigned short         codepage;
  _SQLOLDCHAR            comment[SQL_CMT_SZ + 1];
  _SQLOLDCHAR            ldb[SQL_DBNAME_SZ + 1];
  _SQLOLDCHAR            tdb[SQL_LONG_NAME_SZ + 1];
  _SQLOLDCHAR            ar[SQL_AR_SZ + 1];
  _SQLOLDCHAR            parm[SQL_PARAMETER_SZ + 1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-DIR-ENTRY.
    05 STRUCT-ID             PIC 9(4) COMP-5.
    05 RELEASE-LVL           PIC 9(4) COMP-5.
    05 CODEPAGE              PIC 9(4) COMP-5.
    05 COMMENT               PIC X(30).
    05 FILLER                PIC X.
    05 LDB                   PIC X(8).
    05 FILLER                PIC X.
    05 TDB                   PIC X(18).
    05 FILLER                PIC X.
    05 AR                    PIC X(32).
    05 FILLER                PIC X.
    05 PARM                  PIC X(512).
    05 FILLER                PIC X.
    05 FILLER                PIC X(1).
*
```

SQLA-FLAGINFO

This structure is used to hold flagger information.

Table 19. Fields in the SQLA-FLAGINFO Structure

Field Name	Data Type	Description
VERSION	SMALLINT	Input field that must be set to SQLA_FLAG_VERSION (defined in `sqlaprep`).
MSGS	Structure	An imbedded *sqla_flagmsgs* structure.

Table 20. Fields in the SQLA-FLAGMSGS Structure

Field Name	Data Type	Description
COUNT	SMALLINT	Output field set to the number of messages returned by the flagger.
SQLCA	Array	Array of SQLCA structures returning information from the flagger.

Language Syntax

C Structure

```
/* File: sqlaprep.h */
/* Structure: SQLA-FLAGINFO */
/* ... */
SQL_STRUCTURE sqla_flaginfo
{
  short             version;
  short             padding;
  struct            sqla_flagmsgs msgs;
};
/* ... */

/* File: sqlaprep.h */
/* Structure: SQLA-FLAGMSGS */
/* ... */
SQL_STRUCTURE sqla_flagmsgs
{
  short             count;
  short             padding;
  SQL_STRUCTURE sqlca sqlca[SQLA_FLAG_MAXMSGS];
};
/* ... */
```

COBOL Structure

```
* File: sqlaprep.cbl
01 SQLA-FLAGINFO.
    05 SQLFLAG-VERSION            PIC 9(4) COMP-5.
    05 FILLER                     PIC X(2).
    05 SQLFLAG-MSGS.
        10 SQLFLAG-MSGS-COUNT      PIC 9(4) COMP-5.
        10 FILLER                  PIC X(2).
        10 SQLFLAG-MSGS-SQLCA OCCURS 10 TIMES.
*
```

SQLB-TBS-STATS

This structure is used to return additional table space statistics to an application program.

Table 21. Fields in the SQLB-TBS-STATS Structure

Field Name	Data Type	Description
TOTALPAGES	INTEGER	Total operating system space occupied by the table space (in 4KB pages). For DMS, this is the sum of the container sizes (including overhead). For SMS, this is the sum of all file space used for the tables stored in this table space. This is the only piece of information returned for SMS table spaces; the other fields are set to this value or zero.
USEABLEPAGES	INTEGER	For DMS, equal to TOTALPAGES minus (overhead plus partial extents). For SMS, equal to TOTALPAGES.
USEDPAGES	INTEGER	For DMS, the total number of pages in use. For more information, see "Designing and Choosing Table Spaces" in the *Administration Guide*. For SMS, equal to TOTALPAGES.
FREEPAGES	INTEGER	For DMS, equal to USEABLEPAGES minus USEDPAGES. For SMS, not applicable.
HIGHWATERMARK	INTEGER	For DMS, the high water mark is the current "end" of the table space address space. In other words, the page number of the first free extent following the last allocated extent of a table space. Note that this is not really a "high water mark", but rather a "current water mark", since the value can decrease. For SMS, this is not applicable.

During a table space rebalance, the number of useable pages will include pages for the newly added container, but these new pages will not be reflected in the number of free pages until the rebalance is complete. When a table space rebalance is *not* taking place, the number of used pages plus the number of free pages will equal the number of useable pages.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLB-TBS-STATS */
/* ... */
SQL_STRUCTURE SQLB_TBS_STATS
{
  sqluint32   totalPages;
  sqluint32   useablePages;
  sqluint32   usedPages;
  sqluint32   freePages;
  sqluint32   highWaterMark;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQLB-TBS-STATS.
    05 SQL-TOTAL-PAGES        PIC 9(9) COMP-5.
    05 SQL-USEABLE-PAGES      PIC 9(9) COMP-5.
    05 SQL-USED-PAGES         PIC 9(9) COMP-5.
    05 SQL-FREE-PAGES         PIC 9(9) COMP-5.
    05 SQL-HIGH-WATER-MARK    PIC 9(9) COMP-5.
*
```

SQLB-TBSCONTQRY-DATA

This structure is used to return container data to an application program.

Table 22. Fields in the SQLB-TBSCONTQRY-DATA Structure

Field Name	Data Type	Description
ID	INTEGER	Container identifier.
NTBS	INTEGER	Always 1.
TBSID	INTEGER	Table space identifier.
NAMELEN	INTEGER	Length of the container name (for languages other than C).
NAME	CHAR(256)	Container name.
UNDERDBDIR	INTEGER	Either 1 (container is under the DB directory) or 0 (container is not under the DB directory).
CONTTYPE	INTEGER	Container type.
TOTALPAGES	INTEGER	Total number of pages occupied by the table space container.
USEABLEPAGES	INTEGER	For DMS, TOTALPAGES minus overhead. For SMS, equal to TOTALPAGES.
OK	INTEGER	Either 1 (container is accessible) or 0 (container is inaccessible). Zero indicates an abnormal situation that usually requires the attention of the database administrator.

Possible values for *CONTTYPE* (defined in `sqlutil`) are:

SQLB_CONT_PATH
Specifies a directory path (SMS only).

SQLB_CONT_DISK
Specifies a raw device (DMS only).

SQLB_CONT_FILE
Specifies a file (DMS only).

SQLB-TBSCONTQRY-DATA

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLB-TBSCONTQRY-DATA */
/* ... */
SQL_STRUCTURE SQLB_TBSCONTQRY_DATA
{
  sqluint32   id;
  sqluint32   nTbs;
  sqluint32   tbsID;
  sqluint32   nameLen;
  char        name[SQLB_MAX_CONTAIN_NAME_SZ];
  sqluint32   underDBDir;
  sqluint32   contType;
  sqluint32   totalPages;
  sqluint32   useablePages;
  sqluint32   ok;
};
/* ... */
```

COBOL Structure

```
* File: sqlutbcq.cbl
01 SQLB-TBSCONTQRY-DATA.
    05 SQL-ID                 PIC 9(9) COMP-5.
    05 SQL-N-TBS              PIC 9(9) COMP-5.
    05 SQL-TBS-ID             PIC 9(9) COMP-5.
    05 SQL-NAME-LEN           PIC 9(9) COMP-5.
    05 SQL-NAME               PIC X(256).
    05 SQL-UNDER-DBDIR        PIC 9(9) COMP-5.
    05 SQL-CONT-TYPE          PIC 9(9) COMP-5.
    05 SQL-TOTAL-PAGES        PIC 9(9) COMP-5.
    05 SQL-USEABLE-PAGES      PIC 9(9) COMP-5.
    05 SQL-OK                 PIC 9(9) COMP-5.
*
```

SQLB-TBSPQRY-DATA

This structure is used to return table space data to an application program.

Table 23. Fields in the SQLB-TBSPQRY-DATA Structure

Field Name	Data Type	Description
TBSPQVER	CHAR(8)	Structure version identifier.
ID	INTEGER	Internal identifier for the table space.
NAMELEN	INTEGER	Length of the table space name.
NAME	CHAR(128)	Null-terminated name of the table space.
TOTALPAGES	INTEGER	Number of pages specified by CREATE TABLESPACE (DMS only).
USEABLEPAGES	INTEGER	TOTALPAGES minus overhead (DMS only). This value is rounded down to the next multiple of 4KB.
FLAGS	INTEGER	Bit attributes for the table space.
PAGESIZE	INTEGER	Page size (in bytes) of the table space. Currently fixed at 4KB.
EXTSIZE	INTEGER	Extent size (in pages) of the table space.
PREFETCHSIZE	INTEGER	Prefetch size.
NCONTAINERS	INTEGER	Number of containers in the table space.
TBSSTATE	INTEGER	Table space states.
LIFELSN	CHAR(6)	Time stamp identifying the origin of the table space.
FLAGS2	INTEGER	Bit attributes for the table space.
MINIMUMRECTIME	CHAR(27)	Earliest point in time that may be specified by point-in-time table space rollforward.
STATECHNGOBJ	INTEGER	If TBSSTATE is SQLB_LOAD_PENDING or SQLB_DELETE_PENDING, the object ID in table space STATECHANGEID that caused the table space state to be set. Otherwise zero.
STATECHNGID	INTEGER	If TBSSTATE is SQLB_LOAD_PENDING or SQLB_DELETE_PENDING, the table space ID of the object STATECHANGEOBJ that caused the table space state to be set. Otherwise zero.
NQUIESCERS	INTEGER	If TBSSTATE is SQLB_QUIESCED_SHARE, UPDATE, or EXCLUSIVE, the number of quiescers of the table space and the number of entries in QUIESCERS.
QUIESCEID	INTEGER	The table space ID of the object QUIESCEOBJ that caused the table space to be quiesced.
QUIESCEOBJ	INTEGER	The object ID in table space QUIESCEID that caused the table space to be quiesced.
RESERVED	CHAR(32)	Reserved for future use.

Possible values for *FLAGS* (defined in `sqlutil`) are:

SQLB_TBS_SMS
System Managed Space

SQLB_TBS_DMS
Database Managed Space

SQLB_TBS_ANY
Regular contents

SQLB_TBS_LONG
Long field data

SQLB_TBS_SYSTMP
System temporary data.

SQLB_TBS_USRTMP
User temporary data.

Possible values for *TBSSTATE* (defined in `sqlutil`) are:

SQLB_NORMAL
Normal

SQLB_QUIESCED_SHARE
Quiesced: SHARE

SQLB_QUIESCED_UPDATE
Quiesced: UPDATE

SQLB_QUIESCED_EXCLUSIVE
Quiesced: EXCLUSIVE

SQLB_LOAD_PENDING
Load pending

SQLB_DELETE_PENDING
Delete pending

SQLB_BACKUP_PENDING
Backup pending

SQLB_ROLLFORWARD_IN_PROGRESS
Roll forward in progress

SQLB_ROLLFORWARD_PENDING
Roll forward pending

SQLB_RESTORE_PENDING
Restore pending

SQLB_DISABLE_PENDING
Disable pending

SQLB_REORG_IN_PROGRESS
Reorganization in progress

SQLB_BACKUP_IN_PROGRESS
Backup in progress

SQLB_STORDEF_PENDING
Storage must be defined

SQLB_RESTORE_IN_PROGRESS
Restore in progress

SQLB_STORDEF_ALLOWED
Storage may be defined

SQLB_STORDEF_FINAL_VERSION
Storage definition is in 'final' state

SQLB_STORDEF_CHANGED
Storage definition was changed prior to roll forward

SQLB_REBAL_IN_PROGRESS
DMS rebalancer is active

SQLB_PSTAT_DELETION
Table space deletion in progress

SQLB_PSTAT_CREATION
Table space creation in progress.

Possible values for *FLAGS2* (defined in `sqlutil`) are:

SQLB_STATE_SET
For service use only.

SQLB-TBSPQRY-DATA

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* ... */
SQL_STRUCTURE SQLB_TBSPQRY_DATA
{
   char                         tbspqver[SQLB_SVERSION_SIZE];
   sqluint32                    id;
   sqluint32                    nameLen;
   char                         name[SQLB_MAX_TBS_NAME_SZ];
   sqluint32                    totalPages;
   sqluint32                    useablePages;
   sqluint32                    flags;
   sqluint32                    pageSize;
   sqluint32                    extSize;
   sqluint32                    prefetchSize;
   sqluint32                    nContainers;
   sqluint32                    tbsState;
   char                         lifeLSN[6];
   char                         pad[2];
   sqluint32                    flags2;
   char                         minimumRecTime[SQL_STAMP_STRLEN+1];
   char                         pad1[1];
   sqluint32                    StateChngObj;
   sqluint32                    StateChngID;
   sqluint32                    nQuiescers;
   struct SQLB_QUIESCER_DATA    quiescer[SQLB_MAX_QUIESCERS];
   char                         reserved[32];
};
/* ... */

/* File: sqlutil.h */
/* ... */
SQL_STRUCTURE SQLB_QUIESCER_DATA
{
   sqluint32   quiesceId;
   sqluint32   quiesceObject;
};
/* ... */
```

COBOL Structure

```
* File: sqlutbsp.cbl
01 SQLB-TBSPQRY-DATA.
    05 SQL-TBSPQVER           PIC X(8).
    05 SQL-ID                 PIC 9(9) COMP-5.
    05 SQL-NAME-LEN           PIC 9(9) COMP-5.
    05 SQL-NAME               PIC X(128).
    05 SQL-TOTAL-PAGES        PIC 9(9) COMP-5.
    05 SQL-USEABLE-PAGES      PIC 9(9) COMP-5.
    05 SQL-FLAGS              PIC 9(9) COMP-5.
    05 SQL-PAGE-SIZE          PIC 9(9) COMP-5.
    05 SQL-EXT-SIZE           PIC 9(9) COMP-5.
    05 SQL-PREFETCH-SIZE      PIC 9(9) COMP-5.
    05 SQL-N-CONTAINERS       PIC 9(9) COMP-5.
    05 SQL-TBS-STATE          PIC 9(9) COMP-5.
    05 SQL-LIFE-LSN           PIC X(6).
    05 SQL-PAD                PIC X(2).
    05 SQL-FLAGS2             PIC 9(9) COMP-5.
    05 SQL-MINIMUM-REC-TIME   PIC X(26).
    05 FILLER                 PIC X.
    05 SQL-PAD1               PIC X(1).
    05 SQL-STATE-CHNG-OBJ     PIC 9(9) COMP-5.
    05 SQL-STATE-CHNG-ID      PIC 9(9) COMP-5.
    05 SQL-N-QUIESCERS        PIC 9(9) COMP-5.
    05 SQL-QUIESCER OCCURS 5 TIMES.
        10 SQL-QUIESCE-ID     PIC 9(9) COMP-5.
        10 SQL-QUIESCE-OBJECT PIC 9(9) COMP-5.
    05 SQL-RESERVED           PIC X(32).
*
```

SQLCA

The SQL Communication Area (SQLCA) structure is used by the database manager to return error information to an application program. This structure is updated after every API call and SQL statement issued.

For detailed information about the SQLCA structure, including a description of its fields, see the *SQL Reference*.

Language Syntax

C Structure

```
/* File: sqlca.h */
/* Structure: SQLCA */
/* ... */
SQL_STRUCTURE  sqlca
{
  _SQLOLDCHAR    sqlcaid[8];
  sqlint32       sqlcabc;
  #ifdef DB2_SQL92E
  sqlint32       sqlcade;
  #else
  sqlint32       sqlcode;
  #endif
  short          sqlerrml;
  _SQLOLDCHAR    sqlerrmc[70];
  _SQLOLDCHAR    sqlerrp[8];
  sqlint32       sqlerrd[6];
  _SQLOLDCHAR    sqlwarn[11];
  #ifdef DB2_SQL92E
  _SQLOLDCHAR    sqlstat[5];
  #else
  _SQLOLDCHAR    sqlstate[5];
  #endif
};
/* ... */
```

COBOL Structure

```
* File: sqlca.cbl
01 SQLCA SYNC.
    05 SQLCAID PIC X(8) VALUE "SQLCA   ".
    05 SQLCABC PIC S9(9) COMP-5 VALUE 136.
    05 SQLCODE PIC S9(9) COMP-5.
    05 SQLERRM.
    05 SQLERRP PIC X(8).
    05 SQLERRD OCCURS 6 TIMES PIC S9(9) COMP-5.
    05 SQLWARN.
        10 SQLWARN0 PIC X.
        10 SQLWARN1 PIC X.
        10 SQLWARN2 PIC X.
        10 SQLWARN3 PIC X.
        10 SQLWARN4 PIC X.
        10 SQLWARN5 PIC X.
        10 SQLWARN6 PIC X.
        10 SQLWARN7 PIC X.
        10 SQLWARN8 PIC X.
        10 SQLWARN9 PIC X.
        10 SQLWARNA PIC X.
    05 SQLSTATE PIC X(5).
*
```

SQLCHAR

This structure is used to pass variable length data to the database manager.

Table 24. Fields in the SQLCHAR Structure

Field Name	Data Type	Description
LENGTH	SMALLINT	Length of the character string pointed to by *DATA*.
DATA	CHAR(n)	An array of characters of length *LENGTH*.

Language Syntax

C Structure

```
/* File: sql.h */
/* Structure: SQLCHAR */
/* ... */
SQL_STRUCTURE sqlchar
{
  short                  length;
  _SQLOLDCHAR            data[1];
};
/* ... */
```

COBOL Structure

This is not defined in any header file. The following is an example showing how it can be done:

```
* Replace maxlen with the appropriate value:
01 SQLCHAR.
49 SQLCHAR-LEN  PIC S9(4) COMP-5.
49 SQLCHAR-DATA PIC X(maxlen).
```

SQLDA

The SQL Descriptor Area (SQLDA) structure is a collection of variables that is required for execution of the SQL DESCRIBE statement. The SQLDA variables are options that can be used with the PREPARE, OPEN, FETCH, EXECUTE, and CALL statements.

An SQLDA communicates with dynamic SQL; it can be used in a DESCRIBE statement, modified with the addresses of host variables, and then reused in a FETCH statement.

SQLDAs are supported for all languages, but predefined declarations are provided only for C, REXX, FORTRAN, and COBOL. In REXX, the SQLDA is somewhat different than in the other languages; for information about the use of SQLDAs in REXX, see the *Application Development Guide*.

The meaning of the information in an SQLDA depends on its use. In PREPARE and DESCRIBE, an SQLDA provides information to an application program about a prepared statement. In OPEN, EXECUTE, FETCH, and CALL, an SQLDA describes host variables.

For detailed information about the SQLDA structure, including a description of its fields, see the *SQL Reference*.

Language Syntax

C Structure

```
/* File: sqlda.h */
/* Structure: SQLDA */
/* ... */
SQL_STRUCTURE  sqlda
{
  _SQLOLDCHAR    sqldaid[8];
  long           sqldabc;
  short          sqln;
  short          sqld;
  struct sqlvar  sqlvar[1];
};
/* ... */
```

```
/* File: sqlda.h */
/* Structure: SQLVAR */
/* ... */
SQL_STRUCTURE  sqlvar
{
  short          sqltype;
  short          sqllen;
  _SQLOLDCHAR   *SQL_POINTER sqldata;
  short         *SQL_POINTER sqlind;
  struct sqlname sqlname;
};
/* ... */


/* File: sqlda.h */
/* Structure: SQLNAME */
/* ... */
SQL_STRUCTURE  sqlname
{
  short          length;
  _SQLOLDCHAR    data[30];
};
/* ... */

/* File: sqlda.h */
/* Structure: SQLVAR2 */
/* ... */
SQL_STRUCTURE  sqlvar2
{
  union sql8bytelen len;
  char *SQL_POINTER sqldatalen;
  struct sqldistinct_type sqldatatype_name;
};
/* ... */

/* File: sqlda.h */
/* Structure: SQL8BYTELEN */
/* ... */
union sql8bytelen
{
  long        reserve1[2];
  long        sqllonglen;
};
/* ... */
```

```
/* File: sqlda.h */
/* Structure: SQLDISTINCT-TYPE */
/* ... */
SQL_STRUCTURE  sqldistinct_type
{
  short          length;
  char           data[27];
  char           reserved1[3];
};
/* ... */
```

COBOL Structure

```
* File: sqlda.cbl
01 SQLDA SYNC.
    05 SQLDAID PIC X(8) VALUE "SQLDA  ".
    05 SQLDABC PIC S9(9) COMP-5.
    05 SQLN PIC S9(4) COMP-5.
    05 SQLD PIC S9(4) COMP-5.
    05 SQLVAR-ENTRIES OCCURS 0 TO 1489 TIMES
        10 SQLVAR.
        10 SQLVAR2 REDEFINES SQLVAR.
*
```

SQLDCOL

This structure is used to pass variable column information to "sqluexpr - Export" on page 302, "sqluimpr - Import" on page 320, and "sqluload - Load" on page 345.

Table 25. Fields in the SQLDCOL Structure

Field Name	Data Type	Description
DCOLMETH	SMALLINT	A character indicating the method to be used to select columns within the data file.
DCOLNUM	SMALLINT	The number of columns specified in the array *DCOLNAME*.
DCOLNAME	Array	An array of *DCOLNUM* *sqldcoln* structures.

Table 26. Fields in the SQLDCOLN Structure

Field Name	Data Type	Description
DCOLNLEN	SMALLINT	Length of the data pointed to by *DCOLNPTR*.
DCOLNPTR	Pointer	Pointer to a data element determined by *DCOLMETH*.
Note: The *DCOLNLEN* and *DCOLNPTR* fields are repeated for each column specified.		

Table 27. Fields in the SQLLOCTAB Structure

Field Name	Data Type	Description
LOCPAIR	Array	An array of *sqllocpair* structures.

Table 28. Fields in the SQLLOCPAIR Structure

Field Name	Data Type	Description
BEGIN_LOC	SMALLINT	Starting position of the column data in the external file.
END_LOC	SMALLINT	Ending position of the column data in the external file.

The valid values for *DCOLMETH* (defined in `sqlutil`) are:

SQL_METH_N
Names. When importing or loading, use the column names provided via this structure to identify the data to import or load from the external file. The case of these column names must match the case of

the corresponding names in the system catalogs. When exporting, use the column names provided via this structure as the column names in the output file.

The *dcolnptr* pointer of each element of the *dcolname* array points to an array of characters, of length *dcolnlen* bytes, that make up the name of a column to be imported or loaded. The *dcolnum* field, which must be positive, indicates the number of elements in the *dcolname* array.

This method is invalid if the external file does not contain column names (DEL or ASC format files, for example).

SQL_METH_P
Positions. When importing or loading, use starting column positions provided via this structure to identify the data to import or load from the external file. This method is not valid when exporting data.

The *dcolnptr* pointer of each element of the *dcolname* array is ignored, while the *dcolnlen* field contains a column position in the external file. The *dcolnum* field, which must be positive, indicates the number of elements in the *dcolname* array.

The lowest valid column position value is 1 (indicating the first column), and the highest valid value depends on the external file type. Positional selection is not valid for import of ASC files.

SQL_METH_L
Locations. When importing or loading, use starting and ending column positions provided via this structure to identify the data to import or load from the external file. This method is not valid when exporting data.

The *dcolnptr* field of the first element of the *dcolname* array points to an *sqlloctab* structure, which consists of an array of *sqllocpair* structures. The number of elements in this array is determined by the *dcolnum* field of the *sqldcol* structure, which must be positive. Each element in the array is a pair of 2-byte integers that indicate where the column begins and ends. The first element of each location pair is the byte within the file where the column begins, and the second element is the byte where the column ends. The first byte position within a row in the file is considered byte position 1. The columns can overlap.

This method is the only valid method for importing or loading ASC files.

SQL_METH_D
Default. When importing or loading, the first column of the file is

loaded or imported into the first column of the table, and so on. When exporting, the default names are used for the columns in the external file.

The *dcolnum* and *dcolname* fields of the *sqldcol* structure are both ignored, and the columns from the external file are taken in their natural order.

A column from the external file can be used in the array more than once. It is not necessary to use every column from the external file.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLDCOL */
/* ... */
SQL_STRUCTURE sqldcol
{
  short           dcolmeth;
  short           dcolnum;
  struct sqldcoln dcolname[1];
};
/* ... */

/* File: sqlutil.h */
/* Structure: SQLDCOLN */
/* ... */
SQL_STRUCTURE sqldcoln
{
  short           dcolnlen;
  char            *dcolnptr;
};
/* ... */

/* File: sqlutil.h */
/* Structure: SQLLOCTAB */
/* ... */
SQL_STRUCTURE sqlloctab
{
  struct sqllocpair locpair[1];
};
/* ... */
```

```
/* File: sqlutil.h */
/* Structure: SQLLOCPAIR */
/* ... */
SQL_STRUCTURE sqllocpair
{
  short           begin_loc;
  short           end_loc;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-DCOLDATA.
    05 SQL-DCOLMETH           PIC S9(4) COMP-5.
    05 SQL-DCOLNUM            PIC S9(4) COMP-5.
    05 SQLDCOLN OCCURS 0 TO 255 TIMES DEPENDING ON SQL-DCOLNUM.
        10 SQL-DCOLNLEN       PIC S9(4) COMP-5.
        10 FILLER             PIC X(2).
        10 SQL-DCOLN-PTR      USAGE IS POINTER.
*

* File: sqlutil.cbl
01 SQL-LOCTAB.
    05 SQL-LOC-PAIR OCCURS 1 TIMES.
        10 SQL-BEGIN-LOC      PIC S9(4) COMP-5.
        10 SQL-END-LOC        PIC S9(4) COMP-5.
*
```

SQLE-ADDN-OPTIONS

This structure is used to pass information to "sqleaddn - Add Node" on page 138.

Table 29. Fields in the SQLE-NODE-APPN Structure

Field Name	Data Type	Description
SQLADDID	CHAR	An "eyecatcher" value which must be set to SQLE_ADDOPTID_V51.
TBLSPACE_TYPE	sqluint32	Specifies the type of system temporary table space definitions to be used for the node being added. See below for values.
TBLSPACE_NODE	SQL_PDB_NODE_TYPE	Specifies the node number from which the system temporary table space definitions should be obtained. The node number must exist in the db2nodes.cfg file, and is only used if the *tblspace_type* field is set to SQLE_TABLESPACES_LIKE_NODE.

Valid values for *TBLSPACE_TYPE* (defined in sqlenv) are:

SQLE_TABLESPACES_NONE
Do not create any system temporary table spaces.

SQLE_TABLESPACES_LIKE_NODE
The containers for the system temporary table spaces should be the same as those for the specified node.

SQLE_TABLESPACES_LIKE_CATALOG
The containers for the system temporary table spaces should be the same as those for the catalog node of each database.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-ADDN-OPTIONS */
/* ... */
SQL_STRUCTURE sqle_addn_options
{
  char                  sqladdid[8];
  sqluint32             tblspace_type;
  SQL_PDB_NODE_TYPE     tblspace_node;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLE-ADDN-OPTIONS.
    05 SQLADDID              PIC X(8).
    05 SQL-TBLSPACE-TYPE     PIC 9(9) COMP-5.
    05 SQL-TBLSPACE-NODE     PIC S9(4) COMP-5.
    05 FILLER                PIC X(2).
*
```

SQLE-CLIENT-INFO

This structure is used to pass information to "sqleseti - Set Client Information" on page 251 and "sqleqryi - Query Client Information" on page 239.

This structure specifies:

- The type of information being set or queried
- The length of the data being set or queried
- A pointer to either:
  - An area that will contain the data being set
  - An area of sufficient length to contain the data being queried

Applications can specify the following types of information:

- Client user ID being set or queried. A maximum of 255 characters can be set, although servers can truncate this to some platform-specific value.

  Note: This user ID is for identification purposes only, and is not used for any authorization.
- Client workstation name being set or queried. A maximum of 255 characters can be set, although servers can truncate this to some platform-specific value.
- Client application name being set or queried. A maximum of 255 characters can be set, although servers can truncate this to some platform-specific value.
- Client accounting string being set or queried. A maximum of 200 characters can be set, although servers can truncate this to some platform-specific value.

  Note: The information can be set using "sqlesact - Set Accounting String" on page 243. However, **sqlesact** does not permit the accounting string to be changed once a connection exists, whereas **sqleseti** allows the accounting information to be changed for future, as well as already established, connections.

Table 30. Fields in the SQLE-CLIENT-INFO Structure

Field Name	Data Type	Description
TYPE	sqlint32	Setting type.

Table 30. Fields in the SQLE-CLIENT-INFO Structure (continued)

Field Name	Data Type	Description
LENGTH	sqlint32	Length of the value. On **sqleseti** calls, the length can be between zero and the maximum length defined for the type. A length of zero indicates a null value. On **sqleqryi** calls, the length is returned, but the area pointed to by *pValue* must be large enough to contain the maximum length for the type. A length of zero indicates a null value.
PVALUE	Pointer	Pointer to an application-allocated buffer that contains the specified value. The data type of this value is dependent on the type field.

The valid entries for the SQLE-CLIENT-INFO TYPE element and the associated descriptions for each entry are listed below:

Table 31. Connection Settings

Type	Data Type	Description
SQLE_CLIENT_INFO_USERID	CHAR(255)	The user ID for the client. Some servers may truncate the value. For example, DB2 for OS/390 servers support up to length 16. This user ID is for identification purposes only, and is not used for any authorization.
SQLE_CLIENT_INFO_ WRKSTNNAME	CHAR(255)	The workstation name for the client. Some servers may truncate the value. For example, DB2 for OS/390 servers support up to length 18.
SQLE_CLIENT_INFO_ APPLNAME	CHAR(255)	The application name for the client. Some servers may truncate the value. For example, DB2 for OS/390 servers support up to length 32.

Table 31. Connection Settings (continued)

Type	Data Type	Description
SQLE_CLIENT_INFO_ ACCTSTR	CHAR(200)	The accounting string for the client. Some servers may truncate the value. For example, DB2 for OS/390 servers support up to length 200.
Note: These field names are defined for the C programming language. There are similar names for FORTRAN and COBOL, which have the same semantics.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-CLIENT-INFO */
/* ... */
SQL_STRUCTURE sqle_client_info
{
  unsigned short         type;
  unsigned short         length;
  char                   *pValue;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLE-CLIENT-INFO.
    05 SQLE-CLIENT-INFO-ITEM OCCURS 4 TIMES.
        10 SQLE-CLIENT-INFO-TYPE   PIC S9(4) COMP-5.
        10 SQLE-CLIENT-INFO-LENGTH PIC S9(4) COMP-5.
        10 SQLE-CLIENT-INFO-VALUE  USAGE IS POINTER.
*
```

SQLE-CONN-SETTING

This structure is used to specify connection setting types and values (see “sqleqryc - Query Client” on page 236, and “sqlesetc - Set Client” on page 248).

Table 32. Fields in the SQLE-CONN-SETTING Structure

Field Name	Data Type	Description
TYPE	SMALLINT	Setting type.
VALUE	SMALLINT	Setting value.

The valid entries for the SQLE-CONN-SETTING TYPE element and the associated descriptions for each entry are listed below (defined in `sqlenv` and `sql`):

Table 33. Connection Settings

Type	Value	Description
SQL_CONNECT_TYPE	SQL_CONNECT_1	Type 1 CONNECTs enforce the single database per unit of work semantics of older releases, also known as the rules for remote unit of work (RUOW).
	SQL_CONNECT_2	Type 2 CONNECTs support the multiple databases per unit of work semantics of DUOW.
SQL_RULES	SQL_RULES_DB2	Enable the SQL CONNECT statement to switch the current connection to an established (dormant) connection.
	SQL_RULES_STD	Permit only the establishment of a new connection through the SQL CONNECT statement. The SQL SET CONNECTION statement must be used to switch the current connection to a dormant connection.
SQL_DISCONNECT	SQL_DISCONNECT_EXPL	Removes those connections that have been explicitly marked for release by the SQL RELEASE statement at commit.
	SQL_DISCONNECT_COND	Breaks those connections that have no open WITH HOLD cursors at commit, and those that have been marked for release by the SQL RELEASE statement.

Table 33. Connection Settings (continued)

Type	Value	Description
	SQL_DISCONNECT_AUTO	Breaks all connections at commit.
SQL_SYNCPOINT	SQL_SYNC_TWOPHASE	Requires a Transaction Manager (TM) to coordinate two-phase commits among databases that support this protocol.
	SQL_SYNC_ONEPHASE	Uses one-phase commits to commit the work done by each database in multiple database transactions. Enforces single updater, multiple read behavior.
	SQL_SYNC_NONE	Uses one-phase commits to commit work done, but does not enforce single updater, multiple read behavior.
SQL_MAX_NETBIOS_ CONNECTIONS	Between 1 and 254	This specifies the maximum number of concurrent connections that can be made using a NETBIOS adapter in an application.
SQL_DEFERRED_PREPARE	SQL_DEFERRED_PREPARE_ NO	The PREPARE statement will be executed at the time it is issued.
	SQL_DEFERRED_PREPARE_ YES	Execution of the PREPARE statement will be deferred until the corresponding OPEN, DESCRIBE, or EXECUTE statement is issued. The PREPARE statement will not be deferred if it uses the INTO clause, which requires an SQLDA to be returned immediately. However, if the PREPARE INTO statement is issued for a cursor that does not use any parameter markers, the processing will be optimized by pre-OPENing the cursor when the PREPARE is executed.

Table 33. Connection Settings (continued)

Type	Value	Description
	SQL_DEFERRED_PREPARE_ALL	Same as YES, except that a PREPARE INTO statement which contains parameter markers *is* deferred. If a PREPARE INTO statement does not contain parameter markers, pre-OPENing of the cursor will still be performed. If the PREPARE statement uses the INTO clause to return an SQLDA, the application must not reference the content of this SQLDA until the OPEN, DESCRIBE, or EXECUTE statement is issued and returned.
SQL_CONNECT_NODE	Between 0 and 999, or the keyword SQL_CONN_CATALOG_NODE.	Specifies the node to which a connect is to be made. Overrides the value of the environment variable **DB2NODE**. For example, if nodes 1, 2, and 3 are defined, the client only needs to be able to access one of these nodes. If only node 1 containing databases has been cataloged, and this parameter is set to 3, the next connect attempt will result in a connection at node 3, after an initial connection at node 1.
SQL_ATTACH_NODE	Between 0 and 999.	Specifies the node to which an attach is to be made. Overrides the value of the environment variable **DB2NODE**. For example, if nodes 1, 2, and 3 are defined, the client only needs to be able to access one of these nodes. If only node 1 containing databases has been cataloged, and this parameter is set to 3, then the next attach attempt will result in an attachment at node 3, after an initial attachment at node 1.
Note: These field names are defined for the C programming language. There are similar names for FORTRAN and COBOL, which have the same semantics.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-CONN-SETTING */
/* ... */
SQL_STRUCTURE sqle_conn_setting
{
  unsigned short         type;
  unsigned short         value;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLE-CONN-SETTING.
    05 SQLE-CONN-SETTING-ITEM OCCURS 7 TIMES.
        10 SQLE-CONN-TYPE  PIC S9(4) COMP-5.
        10 SQLE-CONN-VALUE PIC S9(4) COMP-5.
*
```

SQLE-NODE-APPC

This structure is used to catalog APPC nodes (see "sqlectnd - Catalog Node" on page 168).

Table 34. Fields in the SQLE-NODE-APPC Structure

Field Name	Data Type	Description
LOCAL_LU	CHAR(8)	Local_lu name.
PARTNER_LU	CHAR(8)	Alias Partner_lu name.
MODE	CHAR(8)	Mode.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-APPC */
/* ... */
SQL_STRUCTURE sqle_node_appc
{
  _SQLOLDCHAR    local_lu[SQL_LOCLU_SZ + 1];
  _SQLOLDCHAR    partner_lu[SQL_RMTLU_SZ + 1];
  _SQLOLDCHAR    mode[SQL_MODE_SZ + 1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-APPC.
    05 LOCAL-LU              PIC X(8).
    05 FILLER                PIC X.
    05 PARTNER-LU            PIC X(8).
    05 FILLER                PIC X.
    05 TRANS-MODE            PIC X(8).
    05 FILLER                PIC X.
*
```

SQLE-NODE-APPN

This structure is used to catalog APPN nodes (see "sqlectnd - Catalog Node" on page 168).

Table 35. Fields in the SQLE-NODE-APPN Structure

Field Name	Data Type	Description
NETWORKID	CHAR(8)	Network ID.
REMOTE_LU	CHAR(8)	Alias Remote_lu name.
LOCAL_LU	CHAR(8)	Alias Local_lu name.
MODE	CHAR(8)	Mode.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-APPN */
/* ... */
SQL_STRUCTURE sqle_node_appn
{
  _SQLOLDCHAR    networkid[SQL_NETID_SZ + 1];
  _SQLOLDCHAR    remote_lu[SQL_RMTLU_SZ + 1];
  _SQLOLDCHAR    local_lu[SQL_LOCLU_SZ + 1];
  _SQLOLDCHAR    mode[SQL_MODE_SZ + 1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-APPN.
    05 NETWORKID             PIC X(8).
    05 FILLER                PIC X.
    05 REMOTE-LU             PIC X(8).
    05 FILLER                PIC X.
    05 LOCAL-LU              PIC X(8).
    05 FILLER                PIC X.
    05 TRANS-MODE            PIC X(8).
    05 FILLER                PIC X.
*
```

SQLE-NODE-CPIC

This structure is used to catalog CPIC nodes (see "sqlectnd - Catalog Node" on page 168).

Table 36. Fields in the SQLE-NODE-CPIC Structure

Field Name	Data Type	Description
SYM_DEST_NAME	CHAR(8)	Symbolic destination name of remote partner.
SECURITY_TYPE	SMALLINT	Security type.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Valid values for *SECURITY_TYPE* (defined in `sqlenv`) are:

SQL_CPIC_SECURITY_NONE

SQL_CPIC_SECURITY_SAME

SQL_CPIC_SECURITY_PROGRAM

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-CPIC */
/* ... */
SQL_STRUCTURE sqle_node_cpic
{
  _SQLOLDCHAR    sym_dest_name[SQL_SYM_DEST_NAME_SZ+1];
  unsigned short security_type;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-CPIC.
    05 SYM-DEST-NAME          PIC X(8).
    05 FILLER                 PIC X.
    05 FILLER                 PIC X(1).
    05 SECURITY-TYPE          PIC 9(4) COMP-5.
*
```

SQLE-NODE-IPXSPX

This structure is used to catalog IPX/SPX nodes (see "sqlectnd - Catalog Node" on page 168).

Table 37. Fields in the SQLE-NODE-IPXSPX Structure

Field Name	Data Type	Description
FILESERVER	CHAR(48)	Name of the NetWare file server where the DB2 server instance is registered.
OBJECTNAME	CHAR(48)	The database manager server instance is represented as the object, *objectname*, on the NetWare file server. The server's IPX/SPX internetwork address is stored and retrieved from this object.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-IPXSPX */
/* ... */
SQL_STRUCTURE sqle_node_ipxspx
{
  char           fileserver[SQL_FILESERVER_SZ+1];
  char           objectname[SQL_OBJECTNAME_SZ+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-IPXSPX.
    05 SQL-FILESERVER         PIC X(48).
    05 FILLER                 PIC X.
    05 SQL-OBJECTNAME         PIC X(48).
    05 FILLER                 PIC X.
*
```

SQLE-NODE-LOCAL

This structure is used to catalog local nodes (see "sqlectnd - Catalog Node" on page 168).

Table 38. Fields in the SQLE-NODE-LOCAL Structure

Field Name	Data Type	Description
INSTANCE_NAME	CHAR(8)	Name of an instance.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-LOCAL */
/* ... */
SQL_STRUCTURE sqle_node_local
{
  char           instance_name[SQL_INSTNAME_SZ+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-LOCAL.
    05 SQL-INSTANCE-NAME      PIC X(8).
    05 FILLER                 PIC X.
*
```

SQLE-NODE-NETB

This structure is used to catalog NetBIOS nodes (see "sqlectnd - Catalog Node" on page 168).

Table 39. Fields in the SQLE-NODE-NETB Structure

Field Name	Data Type	Description
ADAPTER	SMALLINT	Local LAN adapter.
REMOTE_NNAME	CHAR(8)	*Nname* of the remote workstation that is stored in the database manager configuration file on the server instance.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-NETB */
/* ... */
SQL_STRUCTURE sqle_node_netb
{
  unsigned short adapter;
  _SQLOLDCHAR    remote_nname[SQL_RMTLU_SZ + 1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-NETB.
    05 ADAPTER               PIC 9(4) COMP-5.
    05 REMOTE-NNAME          PIC X(8).
    05 FILLER                PIC X.
    05 FILLER                PIC X(1).
*
```

SQLE-NODE-NPIPE

This structure is used to catalog named pipe nodes (see "sqlectnd - Catalog Node" on page 168).

Table 40. Fields in the SQLE-NODE-NPIPE Structure

Field Name	Data Type	Description
COMPUTERNAME	CHAR(15)	Computer name.
INSTANCE_NAME	CHAR(8)	Name of an instance.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-NPIPE */
/* ... */
SQL_STRUCTURE sqle_node_npipe
{
  char           computername[SQL_COMPUTERNAME_SZ+1];
  char           instance_name[SQL_INSTNAME_SZ+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-NPIPE.
    05 COMPUTERNAME           PIC X(15).
    05 FILLER                 PIC X.
    05 INSTANCE-NAME          PIC X(8).
    05 FILLER                 PIC X.
*
```

SQLE-NODE-STRUCT

This structure is used to catalog nodes (see "sqlectnd - Catalog Node" on page 168).

Table 41. Fields in the SQLE-NODE-STRUCT Structure

Field Name	Data Type	Description
STRUCT_ID	SMALLINT	Structure identifier.
CODEPAGE	SMALLINT	Code page for comment.
COMMENT	CHAR(30)	Optional description of the node.
NODENAME	CHAR(8)	Local name for the node where the database is located.
PROTOCOL	CHAR(1)	Communications protocol type.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Valid values for *PROTOCOL* (defined in `sqlenv`) are:

SQL_PROTOCOL_APPC

SQL_PROTOCOL_APPN

SQL_PROTOCOL_CPIC

SQL_PROTOCOL_IPXSPX

SQL_PROTOCOL_LOCAL

SQL_PROTOCOL_NETB

SQL_PROTOCOL_NPIPE

SQL_PROTOCOL_SOCKS

SQL_PROTOCOL_TCPIP

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-STRUCT */
/* ... */
SQL_STRUCTURE sqle_node_struct
{
  unsigned short struct_id;
  unsigned short codepage;
  _SQLOLDCHAR    comment[SQL_CMT_SZ + 1];
  _SQLOLDCHAR    nodename[SQL_NNAME_SZ + 1];
  unsigned char  protocol;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-STRUCT.
    05 STRUCT-ID             PIC 9(4) COMP-5.
    05 CODEPAGE              PIC 9(4) COMP-5.
    05 COMMENT               PIC X(30).
    05 FILLER                PIC X.
    05 NODENAME              PIC X(8).
    05 FILLER                PIC X.
    05 PROTOCOL              PIC X.
    05 FILLER                PIC X(1).
*
```

SQLE-NODE-TCPIP

This structure is used to catalog TCP/IP nodes (see "sqlectnd - Catalog Node" on page 168).

Note: To catalog a TCP/IP SOCKS node, set the PROTOCOL type in the node directory structure to SQL_PROTOCOL_SOCKS before calling the **sqlectnd** API (see "SQLE-NODE-STRUCT" on page 476).

Table 42. Fields in the SQLE-NODE-TCPIP Structure

Field Name	Data Type	Description
HOSTNAME	CHAR(255)	The name of the TCP/IP host on which the DB2 server instance resides.
SERVICE_NAME	CHAR(14)	TCP/IP service name or associated port number of the DB2 server instance.
Note: The character fields passed in this structure must be null terminated or blank filled up to the length of the field.		

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-NODE-TCPIP */
/* ... */
SQL_STRUCTURE sqle_node_tcpip
{
  _SQLOLDCHAR    hostname[SQL_HOSTNAME_SZ+1];
  _SQLOLDCHAR    service_name[SQL_SERVICE_NAME_SZ+1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQL-NODE-TCPIP.
    05 HOSTNAME               PIC X(255).
    05 FILLER                 PIC X.
    05 SERVICE-NAME           PIC X(14).
    05 FILLER                 PIC X.
*
```

SQLE-REG-NWBINDERY

This structure is used to register/deregister the DB2 server in/from the bindery on the NetWare file server (see "sqleregs - Register" on page 241, and "sqledreg - Deregister" on page 186).

Table 43. Fields in the SQLE-REG-NWBINDERY Structure

Field Name	Data Type	Description
UID	CHAR(48)	User ID used to log into the NetWare file server.
PSWD	CHAR(128)	Password used to validate the user ID.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-REG-NWBINDERY */
/* ... */
SQL_STRUCTURE sqle_reg_nwbindery
{
  char                  uid[SQL_NW_UID_SZ+1];
  unsigned short        reserved_len_1;
  char                  pswd[SQL_NW_PSWD_SZ+1];
  unsigned short        reserved_len_2;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLE-REG-NWBINDERY.
    05 SQL-UID               PIC X(48).
    05 FILLER                PIC X.
    05 FILLER                PIC X(1).
    05 SQL-UID-LEN           PIC 9(4) COMP-5.
    05 SQL-PSWD              PIC X(128).
    05 FILLER                PIC X.
    05 FILLER                PIC X(1).
    05 SQL-PSWD-LEN          PIC 9(4) COMP-5.
*
```

SQLE-START-OPTIONS

This structure is used to provide the database manager start-up options.

Table 44. Fields in the SQLE-START-OPTIONS Structure

Field Name	Data Type	Description
SQLOPTID	CHAR	An "eyecatcher" value which must be set to `SQLE_STARTOPTID_V51`.
ISPROFILE	sqluint32	Indicates whether a profile is specified. If this field indicates that a profile is not specified, the file `db2profile` is used.
PROFILE	CHAR(236)	The name of the profile file to be executed at each node to define the DB2 environment (MPP only). This file is executed before the nodes are started. The default value is `db2profile`.
ISNODENUM	sqluint32	Indicates whether a node number is specified. If specified, the start command only affects the specified node.
NODENUM	SQL_PDB_NODE_TYPE	Node number.
OPTION	sqluint32	Specifies an action. See below for values.
ISHOSTNAME	sqluint32	Indicates whether a host name is specified.
HOSTNAME[a]	CHAR(256)	System name.
ISPORT	sqluint32	Indicates whether a port number is specified.
PORT[a]	SQL_PDB_PORT_TYPE	Port number.
ISNETNAME	sqluint32	Indicates whether a net name is specified.
NETNAME[a]	CHAR(256)	Net name.
TBLSPACE_TYPE	sqluint32	Specifies the type of system temporary table space definitions to be used for the node being added. See below for values.

Table 44. Fields in the SQLE-START-OPTIONS Structure (continued)

Field Name	Data Type	Description
TBLSPACE_NODE	SQL_PDB_NODE_TYPE	Specifies the node number from which the system temporary table space definitions should be obtained. The node number must exist in the `db2nodes.cfg` file, and is only used if the *tblspace_type* field is set to `SQLE_TABLESPACES_LIKE_NODE`.
ISCOMPUTER	sqluint32	Indicates whether a computer name is specified. Valid on OS/2 or the Windows operating system only.
COMPUTER	CHAR(16)	Computer name. Valid on OS/2 or the Windows operating system only.
PUSERNAME	CHAR	Logon account user name. Valid on OS/2 or the Windows operating system only.
PPASSWORD	CHAR	Logon account password. Valid on OS/2 or the Windows operating system only.
[a] This field is valid only for the `SQLE_ADDNODE` or the `SQLE_RESTART` value of the *OPTION* field.		

Valid values for *OPTION* (defined in `sqlenv`) are:

SQLE_NONE
Issue the normal db2start operation.

SQLE_ADDNODE
Issue the ADD NODE command.

SQLE_RESTART
Issue the RESTART DATABASE command.

SQLE_STANDALONE
Start the node in STANDALONE mode.

For more information about these options, see the *Command Reference*.

Valid values for *TBLSPACE_TYPE* (defined in `sqlenv`) are:

SQLE_TABLESPACES_NONE
Do not create any system temporary table spaces.

SQLE_TABLESPACES_LIKE_NODE
The containers for the system temporary table spaces should be the same as those for the specified node.

SQLE_TABLESPACES_LIKE_CATALOG
The containers for the system temporary table spaces should be the same as those for the catalog node of each database.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLE-START-OPTIONS */
/* ... */
SQL_STRUCTURE sqle_start_options
{
  char                  sqloptid[8];
  sqluint32             isprofile;
  char                  profile[SQL_PROFILE_SZ+1];
  sqluint32             isnodenum;
  SQL_PDB_NODE_TYPE     nodenum;
  sqluint32             option;
  sqluint32             ishostname;
  char                  hostname[SQL_HOSTNAME_SZ+1];
  sqluint32             isport;
  SQL_PDB_PORT_TYPE     port;
  sqluint32             isnetname;
  char                  netname[SQL_HOSTNAME_SZ+1];
  sqluint32             tblspace_type;
  SQL_PDB_NODE_TYPE     tblspace_node;
  sqluint32             iscomputer;
  char                  computer[SQL_COMPUTERNAME_SZ+1];
  char                  *pUserName;
  char                  *pPassword;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLE-START-OPTIONS.
    05 SQLOPTID              PIC X(8).
    05 SQL-ISPROFILE         PIC 9(9) COMP-5.
    05 SQL-PROFILE           PIC X(235).
    05 FILLER                PIC X.
    05 SQL-ISNODENUM         PIC 9(9) COMP-5.
    05 SQL-NODENUM           PIC S9(4) COMP-5.
    05 FILLER                PIC X(2).
    05 SQL-OPTION            PIC 9(9) COMP-5.
    05 SQL-ISHOSTNAME        PIC 9(9) COMP-5.
    05 SQL-HOSTNAME          PIC X(255).
    05 FILLER                PIC X.
    05 SQL-ISPORT            PIC 9(9) COMP-5.
    05 SQL-PORT              PIC S9(9) COMP-5.
    05 SQL-ISNETNAME         PIC 9(9) COMP-5.
    05 SQL-NETNAME           PIC X(255).
    05 FILLER                PIC X.
    05 SQL-TBLSPACE-TYPE     PIC 9(9) COMP-5.
    05 SQL-TBLSPACE-NODE     PIC S9(4) COMP-5.
    05 FILLER                PIC X(2).
    05 SQL-ISCOMPUTER        PIC 9(9) COMP-5.
    05 SQL-COMPUTER          PIC X(15).
    05 FILLER                PIC X.
    05 SQL-P-USER-NAME       USAGE IS POINTER.
    05 SQL-P-PASSWORD        USAGE IS POINTER.
*
```

SQLEDBCOUNTRYINFO

This structure is used to provide code set and territory options to “sqlecrea - Create Database” on page 159.

Table 45. Fields in the SQLEDBCOUNTRYINFO Structure

Field Name	Data Type	Description
SQLDBCODESET	CHAR(9)	Database code set.
SQLDBLOCALE	CHAR(5)	Database territory.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLEDBCOUNTRYINFO */
/* ... */
SQL_STRUCTURE sqledbcountryinfo
{
  char                  sqldbcodeset[SQL_CODESET_LEN + 1];
  char                  sqldblocale[SQL_LOCALE_LEN + 1];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLEDBCOUNTRYINFO.
    05 SQLDBCODESET          PIC X(9).
    05 FILLER                PIC X.
    05 SQLDBLOCALE           PIC X(5).
    05 FILLER                PIC X.
*
```

SQLEDBDESC

The Database Description Block (SQLEDBDESC) structure can be used during a call to "sqlecrea - Create Database" on page 159 to specify permanent values for database attributes. These attributes include database comment, collating sequences, and table space definitions.

Table 46. Fields in the SQLEDBDESC Structure

Field Name	Data Type	Description
SQLDBDID	CHAR(8)	A structure identifier and "eye-catcher" for storage dumps. It is a string of eight bytes that must be initialized with the value of `SQLE_DBDESC_2` (defined in `sqlenv`). The contents of this field are validated for version control.
SQLDBCCP	INTEGER	The code page of the database comment. This value is no longer used by the database manager.
SQLDBCSS	INTEGER	A value indicating the source of the database collating sequence. See below for values. **Note:** To specify the IDENTITY collating sequence when creating a database, specify SQL_CS_NONE (which implements a binary collating sequence).
SQLDBUDC	CHAR(256)	The *n*th byte of this field contains the sort weight of the code point whose underlying decimal representation is *n* in the code page of the database. If SQLDBCSS is not equal to `SQL_CS_USER`, this field is ignored.
SQLDBCMT	CHAR(30)	The comment for the database.
SQLDBSGP	INTEGER	Reserved field. No longer used.
SQLDBNSG	SHORT	A value which indicates the number of file segments to be created in the database. The minimum value for this field is 1 and the maximum value for this field is 256. If a value of -1 is supplied, this field will default to 1. **Note:** SQLDBNSG set to zero produces a default for Version 1 compatibility.
SQLTSEXT	INTEGER	A value, in 4KB pages, which indicates the default extent size for each table space in the database. The minimum value for this field is 2 and the maximum value for this field is 256. If a value of -1 is supplied, this field will default to 32.
SQLCATTS	Pointer	A pointer to a table space description control block, SQLETSDESC, which defines the catalog table space. If null, a default catalog table space based on the values of SQLTSEXT and SQLDBNSG will be created.
SQLUSRTS	Pointer	A pointer to a table space description control block, SQLETSDESC, which defines the user table space. If null, a default user table space based on the values of SQLTSEXT and SQLDBNSG will be created.

Table 46. Fields in the SQLEDBDESC Structure (continued)

Field Name	Data Type	Description
SQLTMPTS	Pointer	A pointer to a table space description control block, SQLETSDESC, which defines the system temporary table space. If null, a default system temporary table space based on the values of SQLTSEXT and SQLDBNSG will be created.

The Tablespace Description Block structure (SQLETSDESC) is used to specify the attributes of any of the three initial table spaces.

Table 47. Fields in the SQLETSDESC Structure

Field Name	Data Type	Description
SQLTSDID	CHAR(8)	A structure identifier and "eye-catcher" for storage dumps. It is a string of eight bytes that must be initialized with the value of `SQLE_DBTSDESC_1` (defined in `sqlenv`). The contents of this field are validated for version control.
SQLEXTNT	INTEGER	Table space extentsize, in 4KB pages. If a value of -1 is supplied, this field will default to the current value of the *dft_extent_sz* configuration parameter.
SQLPRFTC	INTEGER	Table space prefetchsize, in 4KB pages. If a value of -1 is supplied, this field will default to the current value of the *dft_prefetch_sz* configuration parameter.
SQLPOVHD	DOUBLE	Table space I/O overhead, in milliseconds. If a value of -1 is supplied, this field will default to an internal database manager value (currently 24.1 ms) that could change with future releases.
SQLTRFRT	DOUBLE	Table space I/O transfer rate, in milliseconds. If a value of -1 is supplied, this field will default to an internal database manager value (currently 0.9 ms) that could change with future releases.
SQLTSTYP	CHAR(1)	Indicates whether the table space is system-managed or database-managed. See below for values.
SQLCCNT	SMALLINT	Number of containers being assigned to the table space. Indicates how many SQLCTYPE/SQLCSIZE/SQLCLEN/SQLCONTR values follow.
CONTAINR	Array	An array of *sqlccnt SQLETSCDESC* structures.

Table 48. Fields in the SQLETSCDESC Structure

Field Name	Data Type	Description
SQLCTYPE	CHAR(1)	Identifies the type of this container. See below for values.
SQLCSIZE	INTEGER	Size of the container identified in *SQLCONTR*, specified in 4KB pages. Valid only when *SQLTSTYP* is set to `SQL_TBS_TYP_DMS`.

Table 48. Fields in the SQLETSCDESC Structure (continued)

Field Name	Data Type	Description
SQLCLEN	SMALLINT	Length of following *SQLCONTR* value.
SQLCONTR	CHAR(256)	Container string.

Valid values for *SQLDBCSS* (defined in `sqlenv`) are:

SQL_CS_SYSTEM
Collating sequence from system.

SQL_CS_USER
Collating sequence from user.

SQL_CS_NONE
None.

SQLE_CS_COMPATABILITY
Use pre-Version 5 collating sequence.

Valid values for *SQLTSTYP* (defined in `sqlenv`) are:

SQL_TBS_TYP_SMS
System managed

SQL_TBS_TYP_DMS
Database managed.

Valid values for *SQLCTYPE* (defined in `sqlenv`) are:

SQL_TBSC_TYP_DEV
Device. Valid only when *SQLTSTYP* = `SQL_TBS_TYP_DMS`.

SQL_TBSC_TYP_FILE
File. Valid only when *SQLTSTYP* = `SQL_TBS_TYP_DMS`.

SQL_TBSC_TYP_PATH
Path (directory). Valid only when *SQLTSTYP* = `SQL_TBS_TYP_SMS`.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLEDBDESC */
/* ... */
SQL_STRUCTURE sqledbdesc
{
  _SQLOLDCHAR    sqldbdid[8];
  sqlint32       sqldbccp;
  sqlint32       sqldbcss;
  unsigned char  sqldbudc[SQL_CS_SZ];
  _SQLOLDCHAR    sqldbcmt[SQL_CMT_SZ+1];
  _SQLOLDCHAR    pad[1];
  sqluint32      sqldbsgp;
  short          sqldbnsg;
  char           pad2[2];
  sqlint32       sqltsext;
  struct SQLETSDESC *sqlcatts;
  struct SQLETSDESC *sqlusrts;
  struct SQLETSDESC *sqltmpts;
};
/* ... */

/* File: sqlenv.h */
/* Structure: SQLETSDESC */
/* ... */
SQL_STRUCTURE SQLETSDESC
{
  char           sqltsdid[8];
  sqlint32       sqlextnt;
  sqlint32       sqlprftc;
  double         sqlpovhd;
  double         sqltrfrt;
  char           sqltstyp;
  char           pad1;
  short          sqlccnt;
  struct SQLETSCDESC containr[1];
};
/* ... */
```

```
/* File: sqlenv.h */
/* Structure: SQLETSCDESC */
/* ... */
SQL_STRUCTURE SQLETSCDESC
{
  char           sqlctype;
  char           pad1[3];
  sqlint32       sqlcsize;
  short          sqlclen;
  char           sqlcontr[SQLB_MAX_CONTAIN_NAME_SZ];
  char           pad2[2];
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLEDBDESC.
    05 SQLDBDID               PIC X(8).
    05 SQLDBCCP               PIC S9(9) COMP-5.
    05 SQLDBCSS               PIC S9(9) COMP-5.
    05 SQLDBUDC               PIC X(256).
    05 SQLDBCMT               PIC X(30).
    05 FILLER                 PIC X.
    05 SQL-PAD                PIC X(1).
    05 SQLDBSGP               PIC 9(9) COMP-5.
    05 SQLDBNSG               PIC S9(4) COMP-5.
    05 SQL-PAD2               PIC X(2).
    05 SQLTSEXT               PIC S9(9) COMP-5.
    05 SQLCATTS               USAGE IS POINTER.
    05 SQLUSRTS               USAGE IS POINTER.
    05 SQLTMPTS               USAGE IS POINTER.
*

* File: sqletsd.cbl
01 SQLETSDESC.
    05 SQLTSDID               PIC X(8).
    05 SQLEXTNT               PIC S9(9) COMP-5.
    05 SQLPRFTC               PIC S9(9) COMP-5.
    05 SQLPOVHD               USAGE COMP-2.
    05 SQLTRFRT               USAGE COMP-2.
    05 SQLTSTYP               PIC X.
    05 SQL-PAD1               PIC X.
    05 SQLCCNT                PIC S9(4) COMP-5.
    05 SQL-CONTAINR OCCURS 001 TIMES.
        10 SQLCTYPE           PIC X.
        10 SQL-PAD1           PIC X(3).
        10 SQLCSIZE           PIC S9(9) COMP-5.
        10 SQLCLEN            PIC S9(4) COMP-5.
        10 SQLCONTR           PIC X(256).
        10 SQL-PAD2           PIC X(2).
*
```

SQLEDBDESC

```
* File: sqlenv.cbl
01 SQLETSCDESC.
    05 SQLCTYPE              PIC X.
    05 SQL-PAD1              PIC X(3).
    05 SQLCSIZE              PIC S9(9) COMP-5.
    05 SQLCLEN               PIC S9(4) COMP-5.
    05 SQLCONTR              PIC X(256).
    05 SQL-PAD2              PIC X(2).
*
```

SQLEDBSTOPOPT

This structure is used to provide the database manager stop options.

Table 49. Fields in the SQLEDBSTOPOPT Structure

Field Name	Data Type	Description
ISPROFILE	sqluint32	Indicates whether a profile is specified. If this field indicates that a profile is not specified, the file `db2profile` is used.
PROFILE	CHAR(236)	The name of the profile file that was executed at startup to define the DB2 environment for those nodes that were started (MPP only). If a profile for "sqlepstart - Start Database Manager" on page 230 was specified, the same profile must be specified here.
ISNODENUM	sqluint32	Indicates whether a node number is specified. If specified, the start command only affects the specified node.
NODENUM	SQL_PDB_NODE_TYPE	Node number.
OPTION	sqluint32	Option.
CALLERAC	sqluint32	Caller action. This field is valid only for the SQLE_DROP value of the OPTION field.

Valid values for *OPTION* (defined in `sqlenv`) are:

SQLE_NONE
Issue the normal db2stop operation.

SQLE_FORCE
Issue the FORCE APPLICATION (ALL) command.

SQLE_DROP
Drop the node from the `db2nodes.cfg` file.

For more information about these options, see the *Command Reference*.

Valid values for *CALLERAC* (defined in `sqlenv`) are:

SQLE_DROP
Initial call. This is the default value.

SQLE_CONTINUE
Subsequent call. Continue processing after a prompt.

SQLE_TERMINATE
Subsequent call. Terminate processing after a prompt.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLEDBSTOPOPT */
/* ... */
SQL_STRUCTURE sqledbstopopt
{
  sqluint32              isprofile;
  char                   profile[SQL_PROFILE_SZ+1];
  sqluint32              isnodenum;
  SQL_PDB_NODE_TYPE      nodenum;
  sqluint32              option;
  sqluint32              callerac;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLEDBSTOPOPT.
    05 SQL-ISPROFILE          PIC 9(9) COMP-5.
    05 SQL-PROFILE            PIC X(235).
    05 FILLER                 PIC X.
    05 SQL-ISNODENUM          PIC 9(9) COMP-5.
    05 SQL-NODENUM            PIC S9(4) COMP-5.
    05 FILLER                 PIC X(2).
    05 SQL-OPTION             PIC 9(9) COMP-5.
    05 SQL-CALLERAC           PIC 9(9) COMP-5.
*
```

SQLEDINFO

This structure is used to return information after a call to "sqledgne - Get Next Database Directory Entry" on page 178. It is shared by both the system database directory and the local database directory.

Table 50. Fields in the SQLEDINFO Structure

Field Name	Data Type	Description
ALIAS	CHAR(8)	An alternate database name.
DBNAME	CHAR(8)	The name of the database.
DRIVE	CHAR(215)	The local database directory path name where the database resides. This field is returned only if the system database directory is opened for scan. **Note:** On OS/2, this field is CHAR(2); on Windows NT, it is CHAR(12).
INTNAME	CHAR(8)	A token identifying the database subdirectory. This field is returned only if the local database directory is opened for scan.
NODENAME	CHAR(8)	The name of the node where the database is located. This field is returned only if the cataloged database is a remote database.
DBTYPE	CHAR(20)	Database manager release information.
COMMENT	CHAR(30)	The comment associated with the database.
COM_CODEPAGE	SMALLINT	The code page of the comment. Not used.
TYPE	CHAR(1)	Entry type. See below for values.
AUTHENTICATION	SMALLINT	Authentication type. See below for values.
GLBDBNAME	CHAR(255)	The global name of the target database in the global (DCE) directory, if the entry is of type `SQL_DCE`.
DCEPRINCIPAL	CHAR(1024)	The principal name if the authentication is of type DCE or KERBEROS.
CAT_NODENUM	SHORT	Catalog node number.
NODENUM	SHORT	Node number.
Note: Both system and local database directory use the same structure, but only certain fields are valid for each. Each character field returned is blank filled up to the length of the field.		

Valid values for *TYPE* (defined in `sqlenv`) are:

SQL_INDIRECT
Database created by the current instance (as defined by the value of the **DB2INSTANCE** environment variable).

SQL_REMOTE
Database resides at a different instance.

SQL_HOME
Database resides on this volume (always HOME in local database directory).

SQL_DCE
Database resides in DCE directories.

Valid values for *AUTHENTICATION* (defined in `sqlenv`) are:

SQL_AUTHENTICATION_SERVER
Authentication of the user name and password takes place at the server.

SQL_AUTHENTICATION_CLIENT
Authentication of the user name and password takes place at the client.

SQL_AUTHENTICATION_DCS
Used for DB2 Connect.

SQL_AUTHENTICATION_DCE
Authentication takes place using DCE Security Services.

SQL_AUTHENTICATION_KERBEROS
Authentication takes place using Kerberos Security Mechanism.

SQL_AUTHENTICATION_NOT_SPECIFIED
DB2 no longer requires authentication to be kept in the database directory. Specify this value when connecting to anything other than a down-level (DB2 V2 or less) server.

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLEDINFO */
/* ... */
SQL_STRUCTURE sqledinfo
{
  _SQLOLDCHAR    alias[SQL_ALIAS_SZ];
  _SQLOLDCHAR    dbname[SQL_DBNAME_SZ];
  _SQLOLDCHAR    drive[SQL_DRIVE_SZ];
  _SQLOLDCHAR    intname[SQL_INAME_SZ];
  _SQLOLDCHAR    nodename[SQL_NNAME_SZ];
  _SQLOLDCHAR    dbtype[SQL_DBTYP_SZ];
  _SQLOLDCHAR    comment[SQL_CMT_SZ];
  short          com_codepage;
  _SQLOLDCHAR    type;
  unsigned short authentication;
  char           glbdbname[SQL_DIR_NAME_SZ];
  _SQLOLDCHAR    dceprincipal[SQL_DCEPRIN_SZ];
  short          cat_nodenum;
  short          nodenum;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLEDINFO.
    05 SQL-ALIAS              PIC X(8).
    05 SQL-DBNAME             PIC X(8).
    05 SQL-DRIVE              PIC X(215).
    05 SQL-INTNAME            PIC X(8).
    05 SQL-NODENAME           PIC X(8).
    05 SQL-DBTYPE             PIC X(20).
    05 SQL-COMMENT            PIC X(30).
    05 FILLER                 PIC X(1).
    05 SQL-COM-CODEPAGE       PIC S9(4) COMP-5.
    05 SQL-TYPE               PIC X.
    05 FILLER                 PIC X(1).
    05 SQL-AUTHENTICATION     PIC 9(4) COMP-5.
    05 SQL-GLBDBNAME          PIC X(255).
    05 SQL-DCEPRINCIPAL       PIC X(1024).
    05 FILLER                 PIC X(1).
    05 SQL-CAT-NODENUM        PIC S9(4) COMP-5.
    05 SQL-NODENUM            PIC S9(4) COMP-5.
*
```

SQLENINFO

This structure returns information after a call to "sqlengne - Get Next Node Directory Entry" on page 225.

Table 51. Fields in the SQLENINFO Structure

Field Name	Data Type	Description
NODENAME	CHAR(8)	Used for the NetBIOS protocol; the *nname* of the node where the database is located (valid in system directory only).
LOCAL_LU	CHAR(8)	Used for the APPN protocol; local logical unit.
PARTNER_LU	CHAR(8)	Used for the APPN protocol; partner logical unit.
MODE	CHAR(8)	Used for the APPN protocol; transmission service mode.
COMMENT	CHAR(30)	The comment associated with the node.
COM_CODEPAGE	SMALLINT	The code page of the comment. This field is no longer used by the database manager.
ADAPTER	SMALLINT	Used for the NetBIOS protocol; the local network adapter.
NETWORKID	CHAR(8)	Used for the APPN protocol; network ID.
PROTOCOL	CHAR(1)	Communications protocol.
SYM_DEST_NAME	CHAR(8)	Used for the APPC protocol; the symbolic destination name.
SECURITY_TYPE	SMALLINT	Used for the APPC protocol; the security type. See below for values.
HOSTNAME	CHAR(255)	Used for the TCP/IP protocol; the name of the TCP/IP host on which the DB2 server instance resides.
SERVICE_NAME	CHAR(14)	Used for the TCP/IP protocol; the TCP/IP service name or associated port number of the DB2 server instance.
FILESERVER	CHAR(48)	Used for the IPX/SPX protocol; the name of the NetWare file server where the DB2 server instance is registered.
OBJECTNAME	CHAR(48)	The database manager server instance is represented as the object, *objectname*, on the NetWare file server. The server's IPX/SPX internetwork address is stored and retrieved from this object.
INSTANCE_NAME	CHAR(8)	Used for the local and NPIPE protocols; the name of the server instance.
COMPUTERNAME	CHAR(15)	Used by the NPIPE protocol; the server node's computer name.
SYSTEM_NAME	CHAR(21)	The DB2 system name of the remote server.
REMOTE_INSTNAME	CHAR(8)	The name of the DB2 server instance.

Table 51. Fields in the SQLENINFO Structure (continued)

Field Name	Data Type	Description
CATALOG_NODE_TYPE	CHAR	Catalog node type.
OS_TYPE	UNSIGNED SHORT	Identifies the operating system of the server.
Note: Each character field returned is blank filled up to the length of the field.		

Valid values for *SECURITY_TYPE* (defined in `sqlenv`) are:

SQL_CPIC_SECURITY_NONE

SQL_CPIC_SECURITY_SAME

SQL_CPIC_SECURITY_PROGRAM

Language Syntax

C Structure

```
/* File: sqlenv.h */
/* Structure: SQLENINFO */
/* ... */
SQL_STRUCTURE sqleninfo
{
  _SQLOLDCHAR    nodename[SQL_NNAME_SZ];
  _SQLOLDCHAR    local_lu[SQL_LOCLU_SZ];
  _SQLOLDCHAR    partner_lu[SQL_RMTLU_SZ];
  _SQLOLDCHAR    mode[SQL_MODE_SZ];
  _SQLOLDCHAR    comment[SQL_CMT_SZ];
  unsigned short com_codepage;
  unsigned short adapter;
  _SQLOLDCHAR    networkid[SQL_NETID_SZ];
  _SQLOLDCHAR    protocol;
  _SQLOLDCHAR    sym_dest_name[SQL_SYM_DEST_NAME_SZ];
  unsigned short security_type;
  _SQLOLDCHAR    hostname[SQL_HOSTNAME_SZ];
  _SQLOLDCHAR    service_name[SQL_SERVICE_NAME_SZ];
  char           fileserver[SQL_FILESERVER_SZ];
  char           objectname[SQL_OBJECTNAME_SZ];
  char           instance_name[SQL_INSTNAME_SZ];
  char           computername[SQL_COMPUTERNAME_SZ];
  char           system_name[SQL_SYSTEM_NAME_SZ];
  char           remote_instname[SQL_REMOTE_INSTNAME_SZ];
  _SQLOLDCHAR    catalog_node_type;
  unsigned short os_type;
};
/* ... */
```

COBOL Structure

```
* File: sqlenv.cbl
01 SQLENINFO.
    05 SQL-NODE-NAME          PIC X(8).
    05 SQL-LOCAL-LU           PIC X(8).
    05 SQL-PARTNER-LU         PIC X(8).
    05 SQL-MODE               PIC X(8).
    05 SQL-COMMENT            PIC X(30).
    05 SQL-COM-CODEPAGE       PIC 9(4) COMP-5.
    05 SQL-ADAPTER            PIC 9(4) COMP-5.
    05 SQL-NETWORKID          PIC X(8).
    05 SQL-PROTOCOL           PIC X.
    05 SQL-SYM-DEST-NAME      PIC X(8).
    05 FILLER                 PIC X(1).
    05 SQL-SECURITY-TYPE      PIC 9(4) COMP-5.
    05 SQL-HOSTNAME           PIC X(255).
    05 SQL-SERVICE-NAME       PIC X(14).
    05 SQL-FILESERVER         PIC X(48).
    05 SQL-OBJECTNAME         PIC X(48).
    05 SQL-INSTANCE-NAME      PIC X(8).
    05 SQL-COMPUTERNAME       PIC X(15).
    05 SQL-SYSTEM-NAME        PIC X(21).
    05 SQL-REMOTE-INSTNAME    PIC X(8).
    05 SQL-CATALOG-NODE-TYPE  PIC X.
    05 SQL-OS-TYPE            PIC 9(4) COMP-5.
*
```

SQLFUPD

This structure passes information about database configuration files and the database manager configuration file. It is used with the database configuration and database manager configuration APIs.

Table 52. Fields in the SQLFUPD Structure

Field Name	Data Type	Description
TOKEN	UINT16	Specifies the configuration value to return or update.
PTRVALUE	Pointer	A pointer to an application allocated buffer that holds the data specified by *TOKEN*.

Valid data types for the *token* element are:

Uint16 Unsigned 2-byte integer

Sint16 Signed 2-byte integer

Uint32 Unsigned 4-byte integer

Sint32 Signed 4-byte integer

float 4-byte floating-point decimal

char(*n*) String of length *n* (not including null termination).

For a complete description of the database configuration parameters, see the *Administration Guide*.

Valid entries for the SQLFUPD *token* element are listed below:

Table 53. Updatable Database Configuration Parameters

Parameter Name	Token	Token Value	Data Type
app_ctl_heap_sz	SQLF_DBTN_APP_CTL_HEAP_SZ	500	Uint16
applheapsz	SQLF_DBTN_APPLHEAPSZ	51	Uint16
audit_buf_sz	SQLF_KTN_AUDIT_BUF_SZ	312	Sint32
autorestart	SQLF_DBTN_AUTO_RESTART	25	Uint16
avg_appls	SQLF_DBTN_AVG_APPLS	47	Uint16
buffpage	SQLF_DBTN_BUFF_PAGE	90	Uint32
catalogcache_sz	SQLF_DBTN_CATALOGCACHE_SZ	56	Sint32
chngpgs_thresh	SQLF_DBTN_CHNGPGS_THRESH	38	Uint16
copyprotect	SQLF_DBTN_COPY_PROTECT	22	Uint16
dbheap	SQLF_DBTN_DB_HEAP	701	Uint64
dft_degree	SQLF_DBTN_DFT_DEGREE	301	Sint32
dft_extent_sz	SQLF_DBTN_DFT_EXTENT_SZ	54	Uint32

Table 53. Updatable Database Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
dft_loadrec_ses	SQLF_DBTN_DFT_LOADREC_SES	42	Sint16
dft_prefetch_sz	SQLF_DBTN_DFT_PREFETCH_SZ	40	Sint16
dft_queryopt	SQLF_DBTN_DFT_QUERYOPT	57	Sint32
dft_refresh_age	SQLF_DBTN_DFT_REFRESH_AGE	702	char(22)
dft_sqlmathwarn	SQLF_DBTN_DFT_SQLMATHWARN	309	Sint16
dir_obj_name	SQLF_DBTN_DIR_OBJ_NAME	46	char(255)
discover	SQLF_DBTN_DISCOVER	308	Uint16
dl_expint	SQLF_DBTN_DL_EXPINT	350	Sint32
dl_num_copies	SQLF_DBTN_DL_NUM_COPIES	351	Uint16
dl_time_drop	SQLF_DBTN_DL_TIME_DROP	353	Uint16
dl_token	SQLF_DBTN_DL_TOKEN	602	char(10)
dl_upper	SQLF_DBTN_DL_UPPER	603	Sint16
dlchktime	SQLF_DBTN_DLCHKTIME	9	Uint32
dyn_query_mgmt	SQLF_DBTN_DYN_QUERY_MGMT	604	Uint16
estore_seg_sz	SQLF_DBTN_ESTORE_SEG_SZ	303	Sint32
indexrec[a]	SQLF_DBTN_INDEXREC	30	Uint16
indexsort	SQLF_DBTN_INDEXSORT	35	Uint16
locklist	SQLF_DBTN_LOCKLIST	1	Uint16
locktimeout	SQLF_DBTN_LOCKTIMEOUT	34	Sint16
logbufsz	SQLF_DBTN_LOGBUFSZ	33	Uint16
logfilsiz	SQLF_DBTN_LOGFIL_SIZ	92	Uint32
logprimary	SQLF_DBTN_LOGPRIMARY	16	Uint16
logretain[b]	SQLF_DBTN_LOG_RETAIN	23	Uint16
logsecond	SQLF_DBTN_LOGSECOND	17	Uint16
maxappls	SQLF_DBTN_MAXAPPLS	6	Uint16
maxfilop	SQLF_DBTN_MAXFILOP	3	Uint16
maxlocks	SQLF_DBTN_MAXLOCKS	15	Uint16
mincommit	SQLF_DBTN_MINCOMMIT	32	Uint16
newlogpath	SQLF_DBTN_NEWLOGPATH	20	char(242)
num_db_backups	SQLF_DBTN_NUM_DB_BACKUPS	352	Uint16
num_estore_segs	SQLF_DBTN_NUM_ESTORE_SEGS	304	Sint32
num_freqvalues	SQLF_DBTN_NUM_FREQVALUES	36	Uint16
num_iocleaners	SQLF_DBTN_NUM_IOCLEANERS	37	Uint16
num_ioservers	SQLF_DBTN_NUM_IOSERVERS	39	Uint16
num_quantiles	SQLF_DBTN_NUM_QUANTILES	48	Uint16
pckcachesz	SQLF_DBTN_PCKCACHE_SZ	505	Uint32

Table 53. Updatable Database Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
rec_his_retentn	SQLF_DBTN_REC_HIS_RETENTN	43	Sint16
seqdetect	SQLF_DBTN_SEQDETECT	41	Uint16
softmax	SQLF_DBTN_SOFTMAX	5	Uint16
sortheap	SQLF_DBTN_SORT_HEAP	52	Uint32
stat_heap_sz	SQLF_DBTN_STAT_HEAP_SZ	45	Uint32
stmtheap	SQLF_DBTN_STMTHEAP	53	Uint16
tsm_mgmtclass	SQLF_DBTN_TSM_MGMTCLASS	307	char(30)
tsm_nodename	SQLF_DBTN_TSM_NODENAME	306	char(64)
tsm_owner	SQLF_DBTN_TSM_OWNER	305	char(64)
tsm_password	SQLF_DBTN_TSM_PASSWORD	501	char(64)
userexit	SQLF_DBTN_USER_EXIT	24	Uint16
util_heap_sz	SQLF_DBTN_UTIL_HEAP_SZ	55	Uint32

[a] Valid values (defined in `sqlutil.h`):

```
SQLF_INX_REC_SYSTEM (0)
SQLF_INX_REC_REFERENCE (1)
SQLF_INX_REC_RESTART (2)
```

[b] Valid values (defined in `sqlutil.h`):

```
SQLF_LOGRETAIN_NO (0)
SQLF_LOGRETAIN_RECOVERY (1)
SQLF_LOGRETAIN_CAPTURE (2)
```

Table 54. Non-updatable Database Configuration Parameters

Parameter Name	Token	Token Value	Data Type
backup_pending	SQLF_DBTN_BACKUP_PENDING	112	Uint16
codepage	SQLF_DBTN_CODEPAGE	101	Uint16
codeset	SQLF_DBTN_CODESET	120	char(9)[a]
collate_info	SQLF_DBTN_COLLATE_INFO	44	char(260)
country	SQLF_DBTN_COUNTRY	100	Uint16
database_consistent	SQLF_DBTN_CONSISTENT	111	Uint16
database_level	SQLF_DBTN_DATABASE_LEVEL	124	Uint16
log_retain_status	SQLF_DBTN_LOG_RETAIN_STATUS	114	Uint16
loghead	SQLF_DBTN_LOGHEAD	105	char(12)
logpath	SQLF_DBTN_LOGPATH	103	char(242)
multipage_alloc	SQLF_DBTN_MULTIPAGE_ALLOC	506	Uint16
numsegs	SQLF_DBTN_NUMSEGS	122	Uint16
release	SQLF_DBTN_RELEASE	102	Uint16
restore_pending	SQLF_DBTN_RESTORE_PENDING	503	Uint16

Table 54. Non-updatable Database Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
rollfwd_pending	SQLF_DBTN_ROLLFWD_PENDING	113	Uint16
territory	SQLF_DBTN_TERRITORY	121	char(5)[b]
user_exit_status	SQLF_DBTN_USER_EXIT_STATUS	115	Uint16

[a] char(17) on HP-UX and Solaris.

[b] char(33) on HP-UX and Solaris.

For a complete description of the database manager configuration parameters, see the *Administration Guide*.

Valid entries for the SQLFUPD *token* element are listed below:

Table 55. Updatable Database Manager Configuration Parameters

Parameter Name	Token	Token Value	Data Type
agent_stack_sz	SQLF_KTN_AGENT_STACK_SZ	61	Uint16
agentpri	SQLF_KTN_AGENTPRI	26	Sint16
aslheapsz	SQLF_KTN_ASLHEAPSZ	15	Uint32
audit_buf_sz	SQLF_KTN_AUDIT_BUF_SZ	312	Sint32
authentication[a]	SQLF_KTN_AUTHENTICATION	78	Uint16
backbufsz	SQLF_KTN_BACKBUFSZ	18	Uint32
catalog_noauth	SQLF_KTN_CATALOG_NOAUTH	314	Uint16
comm_bandwidth	SQLF_KTN_COMM_BANDWIDTH	307	float
conn_elapse	SQLF_KTN_CONN_ELAPSE	508	Uint16
cpuspeed	SQLF_KTN_CPUSPEED	42	float
datalinks	SQLF_KTN_DATALINKS	603	Sint16
dft_account_str	SQLF_KTN_DFT_ACCOUNT_STR	28	char(25)
dft_client_adpt	SQLF_KTN_DFT_CLIENT_ADPT	82	Uint16
dft_client_comm	SQLF_KTN_DFT_CLIENT_COMM	77	char(31)
dft_monswitches	SQLF_KTN_DFT_MONSWITCHES[b]	29	Uint16
dft_mon_bufpool	SQLF_KTN_DFT_MON_BUFPOOL	33	Uint16
dft_mon_lock	SQLF_KTN_DFT_MON_LOCK	34	Uint16
dft_mon_sort	SQLF_KTN_DFT_MON_SORT	35	Uint16
dft_mon_stmt	SQLF_KTN_DFT_MON_STMT	31	Uint16
dft_mon_table	SQLF_KTN_DFT_MON_TABLE	32	Uint16
dft_mon_uow	SQLF_KTN_DFT_MON_UOW	30	Uint16
dftdbpath	SQLF_KTN_DFTDBPATH	27	char(215)
diaglevel	SQLF_KTN_DIAGLEVEL	64	Uint16

Table 55. Updatable Database Manager Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
diagpath	SQLF_KTN_DIAGPATH	65	char(215)
dir_cache	SQLF_KTN_DIR_CACHE	40	Uint16
dir_obj_name	SQLF_KTN_DIR_OBJ_NAME	75	char(255)
dir_path_name	SQLF_KTN_DIR_PATH_NAME	74	char(255)
dir_type[c]	SQLF_KTN_DIR_TYPE	73	Uint16
discover[d]	SQLF_KTN_DISCOVER	304	Uint16
discover_comm	SQLF_KTN_DISCOVER_COMM	305	char(35)
discover_inst	SQLF_KTN_DISCOVER_INST	308	Uint16
dos_rqrioblk	SQLF_KTN_DOS_RQRIOBLK	72	Uint16
drda_heap_sz	SQLF_KTN_DRDA_HEAP_SZ	41	Uint16
fcm_num_anchors	SQLF_KTN_FCM_NUM_ANCHORS	506	Sint32
fcm_num_buffers	SQLF_KTN_FCM_NUM_BUFFERS	503	Uint32
fcm_num_connect	SQLF_KTN_FCM_NUM_CONNECT	505	Sint32
fcm_num_rqb	SQLF_KTN_FCM_NUM_RQB	504	Uint32
federated	SQLF_KTN_FEDERATED	604	Sint16
fileserver	SQLF_KTN_FILESERVER	47	char(48)
indexrec[e]	SQLF_KTN_INDEXREC	20	Uint16
initdari_jvm	SQLF_KTN_INITDARI_JVM	602	Sint16
intra_parallel	SQLF_KTN_INTRA_PARALLEL	306	Sint16
ipx_socket	SQLF_KTN_IPX_SOCKET	71	char(4)
java_heap_sz	SQLF_KTN_JAVA_HEAP_SZ	310	Sint32
jdk11_path	SQLF_KTN_JDK11_PATH	311	char(255)
keepdari	SQLF_KTN_KEEPDARI	81	Uint16
max_connretries	SQLF_KTN_MAX_CONNRETRIES	509	Uint16
max_coordagents	SQLF_KTN_MAX_COORDAGENTS	501	Sint32
max_logicagents	SQLF_KTN_MAX_LOGICAGENTS	70	Sint32
max_querydegree	SQLF_KTN_MAX_QUERYDEGREE	303	Sint32
max_time_diff	SQLF_KTN_MAX_TIME_DIFF	510	Uint16
maxagents	SQLF_KTN_MAXAGENTS	12	Uint32
maxcagents	SQLF_KTN_MAXCAGENTS	13	Sint32
maxdari	SQLF_KTN_MAXDARI	80	Sint32
maxtotfilop	SQLF_KTN_MAXTOTFILOP	45	Uint16
min_priv_mem	SQLF_KTN_MIN_PRIV_MEM	43	Uint32
mon_heap_sz	SQLF_KTN_MON_HEAP_SZ	79	Uint16
nname	SQLF_KTN_NNAME	7	char(8)
notifylevel	SQLF_KTN_NOTIFYLEVEL	605	Sint16

Table 55. Updatable Database Manager Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
num_initagents	SQLF_KTN_NUM_INITAGENTS	500	Uint32
num_initdaris	SQLF_KTN_NUM_INITDARIS	601	Sint32
num_poolagents	SQLF_KTN_NUM_POOLAGENTS	502	Sint32
numdb	SQLF_KTN_NUMDB	6	Uint16
objectname	SQLF_KTN_OBJECTNAME	48	char(48)
priv_mem_thresh	SQLF_KTN_PRIV_MEM_THRESH	44	Sint32
query_heap_sz	SQLF_KTN_QUERY_HEAP_SZ	49	Sint32
restbufsz	SQLF_KTN_RESTBUFSZ	19	Uint32
resync_interval	SQLF_KTN_RESYNC_INTERVAL	68	Uint16
route_obj_name	SQLF_KTN_ROUTE_OBJ_NAME	76	char(255)
rqrioblk	SQLF_KTN_RQRIOBLK	1	Uint16
sheapthres	SQLF_KTN_SHEAPTHRES	21	Uint32
spm_log_file_sz	SQLF_KTN_SPM_LOG_FILE_SZ	90	Sint32
spm_max_resync	SQLF_KTN_SPM_MAX_RESYNC	91	Sint32
spm_name	SQLF_KTN_SPM_NAME	92	char(8)
spm_path_name	SQLF_KTN_SPM_PATH_NAME	313	char(226)
ss_logon	SQLF_KTN_SS_LOGON	309	Uint16
start_stop_time	SQLF_KTN_START_STOP_TIME	511	Uint16
svcename	SQLF_KTN_SVCENAME	24	char(14)
sysadm_group	SQLF_KTN_SYSADM_GROUP	39	char(16)
sysctrl_group	SQLF_KTN_SYSCTRL_GROUP	63	char(16)
sysmaint_group	SQLF_KTN_SYSMAINT_GROUP	62	char(16)
tm_database	SQLF_KTN_TM_DATABASE	67	char(8)
tp_mon_name	SQLF_KTN_TP_MON_NAME	66	char(19)
tpname	SQLF_KTN_TPNAME	25	char(64)
trust_allclnts[f]	SQLF_KTN_TRUST_ALLCLNTS	301	Uint16
trust_clntauth	SQLF_KTN_TRUST_CLNTAUTH	302	Uint16
udf_mem_sz	SQLF_KTN_UDF_MEM_SZ	69	Uint16

Table 55. Updatable Database Manager Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type

[a] Valid values (defined in `sqlenv.h`):

```
SQL_AUTHENTICATION_SERVER (0)
SQL_AUTHENTICATION_CLIENT (1)
SQL_AUTHENTICATION_DCS (2)
SQL_AUTHENTICATION_DCE (3)
SQL_AUTHENTICATION_SVR_ENCRYPT (4)
SQL_AUTHENTICATION_DCS_ENCRYPT (5)
SQL_AUTHENTICATION_DCE_SVR_ENC (6)
SQL_AUTHENTICATION_KERBEROS (7)
SQL_AUTHENTICATION_KRB_SVR_ENC (8)
SQL_AUTHENTICATION_NOT_SPEC (255)
```

[b] SQLF_KTN_DFT_MONSWITCHES is a Uint16 parameter, the bits of which indicate the default monitor switch settings. This allows for the specification of a number of parameters at once. The individual bits making up this composite parameter are:

```
Bit 1 (xxxx xxx1): dft_mon_uow
Bit 2 (xxxx xx1x): dft_mon_stmt
Bit 3 (xxxx x1xx): dft_mon_table
Bit 4 (xxxx 1xxx): dft_mon_buffpool
Bit 5 (xxx1 xxxx): dft_mon_lock
Bit 6 (xx1x xxxx): dft_mon_sort
```

[c] Valid values (defined in `sqlutil.h`):

```
SQLF_DIRTYPE_NONE (0)
SQLF_DIRTYPE_DCE (1)
```

[d] Valid values (defined in `sqlutil.h`):

```
SQLF_DSCVR_KNOWN (1)
SQLF_DSCVR_SEARCH (2)
```

[e] Valid values (defined in `sqlutil.h`):

```
SQLF_INX_REC_SYSTEM (0)
SQLF_INX_REC_REFERENCE (1)
```

[f] Valid values (defined in `sqlutil.h`):

```
SQLF_TRUST_ALLCLNTS_NO (0)
SQLF_TRUST_ALLCLNTS_YES (1)
SQLF_TRUST_ALLCLNTS_DRDAONLY (2)
```

Table 56. Non-updatable Database Manager Configuration Parameters

Parameter Name	Token	Token Value	Data Type
nodetype[a]	SQLF_KTN_NODETYPE	100	Uint16
release	SQLF_KTN_RELEASE	101	Uint16

Table 56. Non-updatable Database Manager Configuration Parameters (continued)

Parameter Name	Token	Token Value	Data Type
[a] Valid values (defined in sqlutil.h): SQLF_NT_STANDALONE (0) SQLF_NT_SERVER (1) SQLF_NT_REQUESTOR (2) SQLF_NT_STAND_REQ (3) SQLF_NT_MPP (4) SQLF_NT_SATELLITE (5)			

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLFUPD */
/* ... */
SQL_STRUCTURE sqlfupd
{
  unsigned short  token;
  char            *ptrvalue;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-FUPD.
    05 SQL-TOKEN              PIC 9(4) COMP-5.
    05 FILLER                 PIC X(2).
    05 SQL-VALUE-PTR          USAGE IS POINTER.
*
```

SQLM-COLLECTED

This structure is used to return information after a call to the Database System Monitor APIs. It will only be filled in for snapshot requests made at the SQLM_DBMON_VERSION5_2 level and lower.

Table 57. Fields in the SQLM-COLLECTED Structure

Field Name	Data Type	Description
SIZE	sqluint32	The size of the structure.
DB2	sqluint32	Obsolete.
DATABASES	sqluint32	Obsolete.
TABLE_DATABASES	sqluint32	Obsolete.
LOCK_DATABASES	sqluint32	Obsolete.
APPLICATIONS	sqluint32	Obsolete.
APPLINFOS	sqluint32	Obsolete.
DCS_APPLINFOS	sqluint32	Obsolete.
SERVER_DB2_TYPE	sqluint32	The database manager server type (defined in `sqlutil.h`).
TIME_STAMP	TIMESTAMP	Time that the snapshot was taken.
GROUP_STATES	OBJECT SQLM_ RECORDING_ GROUP	Current state of the monitor switch.
SERVER_PRDID	CHAR(20)	Product name and version number of the database manager on the server.
SERVER_NNAME	CHAR(20)	Configuration node name of the server.
SERVER_ INSTANCE_NAME	CHAR(20)	Instance name of the database manager.
RESERVED	CHAR(22)	Reserved for future use.
NODE_NUMBER	UNSIGNED SHORT	Number of the node sending data.
TIME_ZONE_DISP	sqlint32	The difference (in seconds) between GMT and local time.
NUM_TOP_LEVEL_ STRUCTS	sqluint32	The total number of high-level structures returned in the snapshot output buffer. A high-level structure can be composed of several lower-level data structures. This counter replaces the individual counters (such as *table_databases*) for each high-level structure, which are now obsolete.
TABLESPACE_ DATABASES	sqluint32	Obsolete.
SERVER_VERSION	sqluint32	The version of the server returning the data.

For information about programming the database monitor, see the *System Monitor Guide and Reference*.

Language Syntax

C Structure

```
/* File: sqlmon.h */
/* Structure: SQLM-COLLECTED */
/* ... */
typedef struct sqlm_collected
{
  sqluint32      size;
  sqluint32      db2;
  sqluint32      databases;
  sqluint32      table_databases;
  sqluint32      lock_databases;
  sqluint32      applications;
  sqluint32      applinfos;
  sqluint32      dcs_applinfos;
  sqluint32      server_db2_type;
  sqlm_timestamp time_stamp;
  sqlm_recording_group group_states[SQLM_NUM_GROUPS];
  _SQLOLDCHAR    server_prdid[SQLM_IDENT_SZ];
  _SQLOLDCHAR    server_nname[SQLM_IDENT_SZ];
  _SQLOLDCHAR    server_instance_name[SQLM_IDENT_SZ];
  _SQLOLDCHAR    reserved[22];
  unsigned short node_number;
  long           time_zone_disp;
  sqluint32      num_top_level_structs;
  sqluint32      tablespace_databases;
  sqluint32      server_version;
}sqlm_collected;
/* ... */
```

COBOL Structure

```
* File: sqlmonct.cbl
01 SQLM-COLLECTED.
    05 SQLM-SIZE               PIC 9(9) COMP-5.
    05 DB2                     PIC 9(9) COMP-5.
    05 DATABASES               PIC 9(9) COMP-5.
    05 TABLE-DATABASES         PIC 9(9) COMP-5.
    05 LOCK-DATABASES          PIC 9(9) COMP-5.
    05 APPLICATIONS            PIC 9(9) COMP-5.
    05 APPLINFOS               PIC 9(9) COMP-5.
    05 DCS-APPLINFOS           PIC 9(9) COMP-5.
    05 SERVER-DB2-TYPE         PIC 9(9) COMP-5.
    05 TIME-STAMP.
        10 SECONDS              PIC 9(9) COMP-5.
        10 MICROSEC             PIC 9(9) COMP-5.
    05 GROUP-STATES OCCURS 6.
        10 INPUT-STATE          PIC 9(9) COMP-5.
        10 OUTPUT-STATE         PIC 9(9) COMP-5.
        10 START-TIME.
    05 SERVER-PRDID            PIC X(20).
    05 SERVER-NNAME            PIC X(20).
    05 SERVER-INSTANCE-NAME    PIC X(20).
    05 RESERVED                PIC X(32).
    05 TABLESPACE-DATABASES    PIC 9(9) COMP-5.
    05 SERVER-VERSION          PIC 9(9) COMP-5.
*
```

SQLM-RECORDING-GROUP

This structure is used to return information after a call to the Database System Monitor APIs.

Table 58. Fields in the SQLM-RECORDING-GROUP Structure

Field Name	Data Type	Description
INPUT_STATE	INTEGER	Required state for the specific monitor group.
OUTPUT_STATE	INTEGER	Returned information on the state of the specific monitor switch.
START_TIME	Structure	Time stamp when the monitoring group switch was turned on.

Table 59. Fields in the SQLM-TIMESTAMP Structure

Field Name	Data Type	Description
SECONDS	INTEGER	The date and time, expressed as the number of seconds since January 1, 1970 (GMT).
MICROSEC	INTEGER	The number of elapsed microseconds in the current second.

For both *input_state* and *output_state*, a particular monitor switch is identified by its index in the array passed to "db2MonitorSwitches - Get/Update Monitor Switches" on page 69. The constants that map the indexes to the switches are called `SQLM_XXXX_SW`, where *XXXX* is the name of the monitor group. These constants are defined in `sqlmon.h`.

For information about programming the database monitor, see the *System Monitor Guide and Reference*.

Language Syntax

C Structure

```
/* File: sqlmon.h */
/* Structure: SQLM-RECORDING-GROUP */
/* ... */
typedef struct sqlm_recording_group
{
  sqluint32      input_state;
  sqluint32      output_state;
  sqlm_timestamp start_time;
}sqlm_recording_group;
/* ... */
```

```
/* File: sqlmon.h */
/* Structure: SQLM-TIMESTAMP */
/* ... */
typedef struct sqlm_timestamp
{
  sqluint32  seconds;
  sqluint32  microsec;
}sqlm_timestamp;
/* ... */
```

COBOL Structure

```
* File: sqlmonct.cbl
01 SQLM-RECORDING-GROUP OCCURS 6 TIMES.
    05 INPUT-STATE             PIC 9(9) COMP-5.
    05 OUTPUT-STATE            PIC 9(9) COMP-5.
    05 START-TIME.
        10 SECONDS              PIC 9(9) COMP-5.
        10 MICROSEC             PIC 9(9) COMP-5.
*

* File: sqlmonct.cbl
01 SQLM-TIMESTAMP.
    05 SECONDS                 PIC 9(9) COMP-5.
    05 MICROSEC                PIC 9(9) COMP-5.
*
```

SQLMA

The SQL Monitor Area (SQLMA) structure is used to send database monitor snapshot requests to the database manager. It is also used to estimate the size (in bytes) of the snapshot output.

Table 60. Fields in the SQLMA Structure

Field Name	Data Type	Description
OBJ_NUM	INTEGER	Number of objects to be monitored.
OBJ_VAR	Array	An array of *sqlm_obj_struct* structures containing descriptions of objects to be monitored. The length of the array is determined by *OBJ_NUM*.

Table 61. Fields in the SQLM-OBJ-STRUCT Structure

Field Name	Data Type	Description
AGENT_ID	INTEGER	The application handle of the application to be monitored. Specified only if *OBJ_TYPE* requires an *agent_id* (application handle).
OBJ_TYPE	INTEGER	The type of object to be monitored.
OBJECT	CHAR(36)	The name of the object to be monitored. Specified only if *OBJ_TYPE* requires a name, such as *appl_id*, or a database alias.

Valid values for *OBJ_TYPE* (defined in `sqlmon`) are:

SQLMA_DB2
DB2 related information

SQLMA_DBASE
Database related information

SQLMA_APPL
Application information organized by the application ID

SQLMA_AGENT_ID
Application information organized by the agent ID

SQLMA_DBASE_TABLES
Table information for a database

SQLMA_DBASE_APPLS
Application information for a database

SQLMA_DBASE_APPLINFO
Summary application information for a database

SQLMA_DBASE_LOCKS
Locking information for a database

SQLMA_DBASE_ALL
Database information for all active databases in the database manager

SQLMA_APPL_ALL
Application information for all active applications in the database manager

SQLMA_APPLINFO_ALL
Summary application information for all active applications in the database manager

SQLMA_DCS_APPLINFO_ALL
Database Connection Services application information summary for all active applications in the database manager.

SQLMA_DYNAMIC_SQL
Get snapshot for dynamic SQL.

SQLMA_DCS_DBASE
Database Connection Services database level information.

SQLMA_DCS_DBASE_ALL
Database Connection Services database information for all active databases.

SQLMA_DCS_APPL_ALL
Database Connection Services application information for all connections.

SQLMA_DCS_APPL
Database Connection Services application information identified by application ID.

SQLMA_DCS_APPL_HANDLE
Database Connection Services application information identified by application handle.

SQLMA_DCS_DBASE_APPLS
Database Connection Services application information for all active connections to the database.

SQLMA_DBASE_TABLESPACES
Table space information for a database.

SQLMA_DBASE_REMOTE
Information for a DataJoiner database.

SQLMA_DBASE_REMOTE_ALL
Information for all DataJoiner databases.

SQLMA_DBASE_APPLS_REMOTE
Application information for a particular DataJoiner database.

SQLMA_APPLS_REMOTE_ALL
Application information for all DataJoiner databases.

For information about programming the database monitor, see the *System Monitor Guide and Reference*.

Language Syntax

C Structure

```
/* File: sqlmon.h */
/* Structure: SQLMA */
/* ... */
typedef struct sqlma
{
  sqluint32 obj_num;
  sqlm_obj_struct obj_var[1];
}sqlma;
/* ... */

/* File: sqlmon.h */
/* Structure: SQLM-OBJ-STRUCT */
/* ... */
typedef struct sqlm_obj_struct
{
  sqluint32     agent_id;
  sqluint32     obj_type;
  _SQLOLDCHAR   object[SQLM_OBJECT_SZ];
}sqlm_obj_struct;
/* ... */
```

COBOL Structure

```
* File: sqlmonct.cbl
01 SQLMA.
    05 OBJ-NUM                 PIC 9(9) COMP-5.
    05 OBJ-VAR OCCURS 0 TO 100 TIMES DEPENDING ON OBJ-NUM.
        10 AGENT-ID             PIC 9(9) COMP-5.
        10 OBJ-TYPE             PIC 9(9) COMP-5.
        10 OBJECT               PIC X(36).
*
```

SQLOPT

This structure is used to pass bind options to "sqlabndx - Bind" on page 85, precompile options to "sqlaprep - Precompile Program" on page 93, and rebind options to "sqlarbnd - Rebind" on page 99.

Table 62. Fields in the SQLOPT Structure

Field Name	Data Type	Description
HEADER	Structure	An *sqloptheader* structure.
OPTION	Array	An array of *sqloptions* structures. The number of elements in this array is determined by the value of the *allocated* field of the *header*.

Table 63. Fields in the SQLOPTHEADER Structure

Field Name	Data Type	Description
ALLOCATED	INTEGER	Number of elements in the *option* array of the *sqlopt* structure.
USED	INTEGER	Number of elements in the *option* array of the *sqlopt* structure actually used. This is the number of option pairs (*TYPE* and *VAL*) supplied.

Table 64. Fields in the SQLOPTIONS Structure

Field Name	Data Type	Description
TYPE	INTEGER	Bind/precompile/rebind option type.
VAL	INTEGER	Bind/precompile/rebind option value.
Note: The *TYPE* and *VAL* fields are repeated for each bind/precompile/rebind option specified.		

For more information about valid values for *TYPE* and *VAL*, see "sqlabndx - Bind" on page 85, "sqlaprep - Precompile Program" on page 93 and "sqlarbnd - Rebind" on page 99.

Language Syntax

C Structure

```
/* File: sql.h */
/* Structure: SQLOPT */
/* ... */
SQL_STRUCTURE sqlopt
{
  SQL_STRUCTURE sqloptheader header;
  SQL_STRUCTURE sqloptions   option[1];
};
/* ... */
```

```
/* File: sql.h */
/* Structure: SQLOPTHEADER */
/* ... */
SQL_STRUCTURE sqloptheader
{
  sqluint32 allocated;
  sqluint32 used;
};
/* ... */


/* File: sql.h */
/* Structure: SQLOPTIONS */
/* ... */
SQL_STRUCTURE sqloptions
{
  sqluint32 type;
  sqluint32 val;
};
/* ... */
```

COBOL Structure

```
* File: sql.cbl
01 SQLOPT.
    05 SQLOPTHEADER.
        10 ALLOCATED   PIC 9(9) COMP-5.
        10 USED        PIC 9(9) COMP-5.
    05 SQLOPTIONS OCCURS 1 TO 50 DEPENDING ON ALLOCATED.
        10 SQLOPT-TYPE        PIC 9(9) COMP-5.
        10 SQLOPT-VAL         PIC 9(9) COMP-5.
        10 SQLOPT-VAL-PTR     REDEFINES SQLOPT-VAL
*
```

SQLU-LSN

This union, used by "sqlurlog - Asynchronous Read Log" on page 394, contains the definition of the log sequence number. A log sequence number (LSN) represents a relative byte address within the database log. All log records are identified by this number. It represents the log record's byte offset from the beginning of the database log.

Table 65. Fields in the SQLU-LSN Union

Field Name	Data Type	Description
lsnChar	Array of UNSIGNED CHAR	Specifies the 6-member character array log sequence number.
lsnWord	Array of UNSIGNED SHORT	Specifies the 3-member short array log sequence number.

Language Syntax

C Structure

```
typedef union SQLU_LSN
{
unsigned char  lsnChar  [6] ;
unsigned short lsnWord  [3] ;
} SQLU_LSN;
```

SQLU-MEDIA-LIST

This structure is used to:

- Hold a list of *target* media for the backup image (see "sqlubkp - Backup Database" on page 290)
- Hold a list of *source* media for the backup image (see "sqlurestore - Restore Database" on page 381)
- Pass information to "sqluload - Load" on page 345.

Table 66. Fields in the SQLU-MEDIA-LIST Structure

Field Name	Data Type	Description
MEDIA_TYPE	CHAR(1)	A character indicating media type.
SESSIONS	INTEGER	Indicates the number of elements in the array pointed to by the *target* field of this structure.
TARGET	Union	This field is a pointer to one of three types of structures. The type of structure pointed to is determined by the value of the *media_type* field. For more information on what to provide in this field, see the appropriate API.

Table 67. Fields in the SQLU-MEDIA-LIST-TARGETS Structure

Field Name	Data Type	Description
MEDIA	Pointer	A pointer to an *sqlu_media_entry* structure.
VENDOR	Pointer	A pointer to an *sqlu_vendor* structure.
LOCATION	Pointer	A pointer to an *sqlu_location_entry* structure.

Table 68. Fields in the SQLU-MEDIA-ENTRY Structure

Field Name	Data Type	Description
RESERVE_LEN	INTEGER	Length of the *media_entry* field. For languages other than C.
MEDIA_ENTRY	CHAR(215)	Path for a backup image used by the backup and restore utilities.

Table 69. Fields in the SQLU-VENDOR Structure

Field Name	Data Type	Description
RESERVE_LEN1	INTEGER	Length of the *shr_lib* field. For languages other than C.
SHR_LIB	CHAR(255)	Name of a shared library supplied by vendors for storing or retrieving data.
RESERVE_LEN2	INTEGER	Length of the *filename* field. For languages other than C.
FILENAME	CHAR(255)	File name to identify the load input source when using a shared library.

Table 70. Fields in the SQLU-LOCATION-ENTRY Structure

Field Name	Data Type	Description
RESERVE_LEN	INTEGER	Length of the *location_entry* field. For languages other than C.
LOCATION_ENTRY	CHAR(256)	Name of input data files for the load utility.

Valid values for *MEDIA_TYPE* (defined in `sqlutil`) are:

SQLU_LOCAL_MEDIA
Local devices (tapes, disks, or diskettes)

SQLU_SERVER_LOCATION
Server devices (tapes, disks, or diskettes; load only). Can be specified only for the *pDataFileList* parameter.

SQLU_TSM_MEDIA
TSM

SQLU_OTHER_MEDIA
Vendor library

SQLU_USER_EXIT
User exit (OS/2 only)

SQLU_PIPE_MEDIA
Named pipe (for vendor APIs only)

SQLU_DISK_MEDIA
Disk (for vendor APIs only)

SQLU_DISKETTE_MEDIA
Diskette (for vendor APIs only)

SQLU_TAPE_MEDIA
Tape (for vendor APIs only).

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLU-MEDIA-LIST */
/* ... */
typedef SQL_STRUCTURE sqlu_media_list
{
  char            media_type;
  char            filler[3];
  sqlint32            sessions;
  union sqlu_media_list_targets target;
} sqlu_media_list;
/* ... */
```

SQLU-MEDIA-LIST

```
/* File: sqlutil.h */
/* Structure: SQLU-MEDIA-LIST-TARGETS */
/* ... */
union sqlu_media_list_targets
{
  struct sqlu_media_entry        *media;
  struct sqlu_vendor             *vendor;
  struct sqlu_location_entry     *location;
};
/* ... */


/* File: sqlutil.h */
/* Structure: SQLU-MEDIA-ENTRY */
/* ... */
typedef SQL_STRUCTURE sqlu_media_entry
{
  sqluint32       reserve_len;
  char            media_entry[SQLU_DB_DIR_LEN+1];
} sqlu_media_entry;
/* ... */

/* File: sqlutil.h */
/* Structure: SQLU-VENDOR */
/* ... */
typedef SQL_STRUCTURE sqlu_vendor
{
  sqluint32       reserve_len1;
  char            shr_lib[SQLU_SHR_LIB_LEN+1];
  sqluint32       reserve_len2;
  char            filename[SQLU_SHR_LIB_LEN+1];
} sqlu_vendor;
/* ... */

/* File: sqlutil.h */
/* Structure: SQLU-LOCATION-ENTRY */
/* ... */
typedef SQL_STRUCTURE sqlu_location_entry
{
  sqluint32       reserve_len;
  char            location_entry[SQLU_MEDIA_LOCATION_LEN+1];
} sqlu_location_entry;
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQLU-MEDIA-LIST.
    05 SQL-MEDIA-TYPE         PIC X.
    05 SQL-FILLER             PIC X(3).
    05 SQL-SESSIONS           PIC S9(9) COMP-5.
    05 SQL-TARGET.
        10 SQL-MEDIA          USAGE IS POINTER.
        10 SQL-VENDOR         REDEFINES SQL-MEDIA
        10 SQL-LOCATION       REDEFINES SQL-MEDIA
        10 FILLER             REDEFINES SQL-MEDIA
*

* File: sqlutil.cbl
01 SQLU-MEDIA-ENTRY.
    05 SQL-MEDENT-LEN         PIC 9(9) COMP-5.
    05 SQL-MEDIA-ENTRY        PIC X(215).
    05 FILLER                 PIC X.
*

* File: sqlutil.cbl
01 SQLU-VENDOR.
    05 SQL-SHRLIB-LEN         PIC 9(9) COMP-5.
    05 SQL-SHR-LIB            PIC X(255).
    05 FILLER                 PIC X.
    05 SQL-FILENAME-LEN       PIC 9(9) COMP-5.
    05 SQL-FILENAME           PIC X(255).
    05 FILLER                 PIC X.
*

* File: sqlutil.cbl
01 SQLU-LOCATION-ENTRY.
    05 SQL-LOCATION-LEN       PIC 9(9) COMP-5.
    05 SQL-LOCATION-ENTRY     PIC X(255).
    05 FILLER                 PIC X.
*
```

SQLU-RLOG-INFO

This structure contains information regarding calls to "sqlurlog - Asynchronous Read Log" on page 394. The read log information structure contains information on the status of the call and the database log.

Table 71. Fields in the SQLU-RLOG-INFO Structure

Field Name	Data Type	Description
initialLSN	SQLU_LSN	Specifies the LSN value of the first log record written to the database after the first *connect* is issued. For more information on the *SQLU_LSN* structure, see "SQLU-LSN" on page 517.
firstReadLSN	SQLU_LSN	Specifies the LSN value of the first log record read.
lastReadLSN	SQLU_LSN	Specifies the LSN value of the last log record byte read.
curActiveLSN	SQLU_LSN	Specifies the LSN value of the current active log.
logRecsWritten	sqluint32	Specifies the number of log records written to the buffer.
logBytesWritten	sqluint32	Specifies the number of bytes written to the buffer.

Language Syntax

C Structure

```
typedef SQL_STRUCTURE SQLU_RLOG_INFO
{
SQLU_LSN       initialLSN ;
SQLU_LSN       firstReadLSN ;
SQLU_LSN       lastReadLSN ;
SQLU_LSN       curActiveLSN ;
sqluint32      logRecsWritten ;
sqluint32      logBytesWritten ;
} SQLU_RLOG_INFO;
```

SQLU-TABLESPACE-BKRST-LIST

This structure is used to provide a list of table space names.

Table 72. Fields in the SQLU-TABLESPACE-BKRST-LIST Structure

Field Name	Data Type	Description
NUM_ENTRY	INTEGER	Number of entries in the list pointed to by the *tablespace* field.
TABLESPACE	Pointer	A pointer to an *sqlu_tablespace_entry* structure.

Table 73. Fields in the SQLU-TABLESPACE-ENTRY Structure

Field Name	Data Type	Description
RESERVE_LEN	INTEGER	Length of the character string provided in the *tablespace_entry* field. For languages other than C.
TABLESPACE_ENTRY	CHAR(19)	Table space name.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLU-TABLESPACE-BKRST-LIST */
/* ... */
typedef SQL_STRUCTURE sqlu_tablespace_bkrst_list
{
  long            num_entry;
  struct sqlu_tablespace_entry *tablespace;
} sqlu_tablespace_bkrst_list;
/* ... */

/* File: sqlutil.h */
/* Structure: SQLU-TABLESPACE-ENTRY */
/* ... */
typedef SQL_STRUCTURE sqlu_tablespace_entry
{
  sqluint32       reserve_len;
  char            tablespace_entry[SQLU_MAX_TBS_NAME_LEN+1];
  char            filler[1];
} sqlu_tablespace_entry;
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQLU-TABLESPACE-BKRST-LIST.
    05 SQL-NUM-ENTRY          PIC S9(9) COMP-5.
    05 SQL-TABLESPACE         USAGE IS POINTER.
*
```

SQLU-TABLESPACE-BKRST-LIST

```
* File: sqlutil.cbl
01 SQLU-TABLESPACE-ENTRY.
    05 SQL-TBSP-LEN           PIC 9(9) COMP-5.
    05 SQL-TABLESPACE-ENTRY   PIC X(18).
    05 FILLER                 PIC X.
    05 SQL-FILLER             PIC X(1).
*
```

SQLUEXPT-OUT

This structure is used to pass information from "sqluexpr - Export" on page 302.

Table 74. Fields in the SQLUEXPT-OUT Structure

Field Name	Data Type	Description
SIZEOFSTRUCT	INTEGER	Size of the structure.
ROWSEXPORTED	INTEGER	Number of records exported from the database into the target file.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQL-UEXPT-OUT */
/* ... */
SQL_STRUCTURE sqluexpt_out
{
  sqluint32       sizeOfStruct;
  sqluint32       rowsExported;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-UEXPT-OUT.
    05 SQL-SIZE-OF-UEXPT-OUT  PIC 9(9) COMP-5 VALUE 8.
    05 SQL-ROWSEXPORTED       PIC 9(9) COMP-5 VALUE 0.
*
```

SQLUIMPT-IN

This structure is used to pass information to "sqluimpr - Import" on page 320.

Table 75. Fields in the SQLUIMPT-IN Structure

Field Name	Data Type	Description
SIZEOFSTRUCT	INTEGER	Size of this structure in bytes.
COMMITCNT	INTEGER	The number of records to import before committing them to the database. A COMMIT is performed whenever *commitcnt* records are imported.
RESTARTCNT	INTEGER	The number of records to skip before starting to insert or update records. This parameter should be used if a previous attempt to import records fails after some records have been committed to the database. The specified value represents a starting point for the next import operation.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLUIMPT-IN */
/* ... */
SQL_STRUCTURE sqluimpt_in
{
  sqluint32       sizeOfStruct;
  sqluint32       commitcnt;
  sqluint32       restartcnt;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-UIMPT-IN.
    05 SQL-SIZE-OF-UIMPT-IN   PIC 9(9) COMP-5 VALUE 12.
    05 SQL-COMMITCNT          PIC 9(9) COMP-5 VALUE 0.
    05 SQL-RESTARTCNT         PIC 9(9) COMP-5 VALUE 0.
*
```

SQLUIMPT-OUT

This structure is used to pass information from "sqluimpr - Import" on page 320.

Table 76. Fields in the SQLUIMPT-OUT Structure

Field Name	Data Type	Description
SIZEOFSTRUCT	INTEGER	Size of this structure in bytes.
ROWSREAD	INTEGER	Number of records read from the file during import.
ROWSSKIPPED	INTEGER	Number of records skipped before inserting or updating begins.
ROWSINSERTED	INTEGER	Number of rows inserted into the target table.
ROWSUPDATED	INTEGER	Number of rows in the target table updated with information from the imported records (records whose primary key value already exists in the table).
ROWSREJECTED	INTEGER	Number of records that could not be imported.
ROWSCOMMITTED	INTEGER	Number of records imported successfully and committed to the database.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLUIMPT-OUT */
/* ... */
SQL_STRUCTURE sqluimpt_out
{
  sqluint32       sizeOfStruct;
  sqluint32       rowsRead;
  sqluint32       rowsSkipped;
  sqluint32       rowsInserted;
  sqluint32       rowsUpdated;
  sqluint32       rowsRejected;
  sqluint32       rowsCommitted;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQL-UIMPT-OUT.
    05 SQL-SIZE-OF-UIMPT-OUT  PIC 9(9) COMP-5 VALUE 28.
    05 SQL-ROWSREAD           PIC 9(9) COMP-5 VALUE 0.
    05 SQL-ROWSSKIPPED        PIC 9(9) COMP-5 VALUE 0.
    05 SQL-ROWSINSERTED       PIC 9(9) COMP-5 VALUE 0.
    05 SQL-ROWSUPDATED        PIC 9(9) COMP-5 VALUE 0.
    05 SQL-ROWSREJECTED       PIC 9(9) COMP-5 VALUE 0.
    05 SQL-ROWSCOMMITTED      PIC 9(9) COMP-5 VALUE 0.
*
```

SQLULOAD-IN

This structure is used to input information during a call to "sqluload - Load" on page 345.

Table 77. Fields in the SQLULOAD-IN Structure

Field Name	Data Type	Description
SIZEOFSTRUCT	sqluint32	Size of this structure in bytes.
SAVECNT	sqluint32	The number of records to load before establishing a consistency point. This value is converted to a page count, and rounded up to intervals of the extent size. Since a message is issued at each consistency point, this option should be selected if the load operation will be monitored using "db2LoadQuery - Load Query" on page 65. If the value of *savecnt* is not sufficiently high, the synchronization of activities performed at each consistency point will impact performance. The default value is `0`, meaning that no consistency points will be established, unless necessary.
RESTARTCNT	sqluint32G	Reserved.
ROWCNT	sqluint32	The number of physical records to be loaded. Allows a user to load only the first *rowcnt* rows in a file.
WARNINGCNT	sqluint32	Stops the load operation after *warningcnt* warnings. Set this parameter if no warnings are expected, but verification that the correct file and table are being used is desired. If *warningcnt* is `0`, or this option is not specified, the load operation will continue regardless of the number of warnings issued. If the load operation is stopped because the threshold of warnings was exceeded, another load operation can be started in RESTART mode. The load operation will automatically continue from the last consistency point. Alternatively, another load operation can be initiated in REPLACE mode, starting at the beginning of the input file.

Table 77. Fields in the SQLULOAD-IN Structure (continued)

Field Name	Data Type	Description
DATA_BUFFER_SIZE	sqluint32	The number of 4KB pages (regardless of the degree of parallelism) to use as buffered space for transferring data within the utility. If the value specified is less than the algorithmic minimum, the required minimum is used, and no warning is returned. This memory is allocated directly from the utility heap, whose size can be modified through the *util_heap_sz* database configuration parameter. If a value is not specified, an intelligent default is calculated by the utility at run time. The default is based on a percentage of the free space available in the utility heap at the instantiation time of the loader, as well as some characteristics of the table.
SORT_BUFFER_SIZE	sqluint32	Reserved.
HOLD_QUIESCE	UNSIGNED SHORT	A flag whose value is set to `TRUE` if the utility is to leave the table in quiesced exclusive state after the load, and to `FALSE` if it is not.
RESTARTPHASE	CHAR(1)	Reserved.
STATSOPT	CHAR(1)	Granularity of statistics to collect. See below for values.
CPU_PARALLELISM	UNSIGNED SHORT	The number of processes or threads that the load utility will spawn for parsing, converting and formatting records when building table objects. This parameter is designed to exploit intra-partition parallelism. It is particularly useful when loading presorted data, because record order in the source data is preserved. If the value of this parameter is zero, the load utility uses an intelligent default value at run time. **Note:** If this parameter is used with tables containing either LOB or LONG VARCHAR fields, its value becomes one, regardless of the number of system CPUs, or the value specified by the user.
DISK_PARALLELISM	UNSIGNED SHORT	The number of processes or threads that the load utility will spawn for writing data to the table space containers. If a value is not specified, the utility selects an intelligent default based on the number of table space containers and the characteristics of the table.

Table 77. Fields in the SQLULOAD-IN Structure (continued)

Field Name	Data Type	Description
NON_RECOVERABLE	UNSIGNED SHORT	Set to SQLU_NON_RECOVERABLE_LOAD if the load transaction is to be marked as non-recoverable, and it will not be possible to recover it by a subsequent roll forward action. The rollforward utility will skip the transaction, and will mark the table into which data was being loaded as "invalid". The utility will also ignore any subsequent transactions against that table. After the roll forward is completed, such a table can only be dropped. With this option, table spaces are not put in backup pending state following the load operation, and a copy of the loaded data does not have to be made during the load operation. Set to SQLU_RECOVERABLE_LOAD if the load transaction is to be marked as recoverable.
INDEXING_MODE	UNSIGNED SHORT	Specifies whether the load utility is to rebuild indexes or to extend them incrementally. See below for values.

Valid values for *STATSOPT* (defined in `sqlutil`) are:

SQLU_STATS_NONE

SQL_STATS_EXTTABLE_ONLY

SQL_STATS_EXTTABLE_INDEX

SQL_STATS_INDEX

SQL_STATS_TABLE

SQL_STATS_EXTINDEX_ONLY

SQL_STATS_EXTINDEX_TABLE

SQL_STATS_ALL

SQL_STATS_BOTH

Valid values for *INDEXING_MODE* (defined in `sqlutil`) are:

SQLU_INX_AUTOSELECT

SQLU_INX_REBUILD

SQLU_INX_INCREMENTAL

SQLU_INX_DEFERRED

For an explanation of these indexing modes, see the description of the LOAD command in the *Command Reference*.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLULOAD-IN */
/* ... */
SQL_STRUCTURE sqluload_in
{
  sqluint32       sizeOfStruct;
  sqluint32       savecnt;
  sqluint32       restartcnt;
  sqluint32       rowcnt;
  sqluint32       warningcnt;
  sqluint32       data_buffer_size;
  sqluint32       sort_buffer_size;  /* No longer used. */
  unsigned short  hold_quiesce;
  char            restartphase;
  char            statsopt;
  unsigned short  cpu_parallelism;
  unsigned short  disk_parallelism;
  unsigned short  non_recoverable;
  unsigned short  indexing_mode;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQLULOAD-IN.
    05 SQL-SIZE-OF-STRUCT     PIC 9(9) COMP-5 VALUE 40.
    05 SQL-SAVECNT            PIC 9(9) COMP-5.
    05 SQL-RESTARTCOUNT       PIC 9(9) COMP-5.
    05 SQL-ROWCNT             PIC 9(9) COMP-5.
    05 SQL-WARNINGCNT         PIC 9(9) COMP-5.
    05 SQL-DATA-BUFFER-SIZE   PIC 9(9) COMP-5.
    05 SQL-SORT-BUFFER-SIZE   PIC 9(9) COMP-5.  * No longer used.
    05 SQL-HOLD-QUIESCE       PIC 9(4) COMP-5.
    05 SQL-RESTARTPHASE       PIC X.
    05 SQL-STATSOPT           PIC X.
    05 SQL-CPU-PARALLELISM    PIC 9(4) COMP-5.
    05 SQL-DISK-PARALLELISM   PIC 9(4) COMP-5.
    05 SQL-NON-RECOVERABLE    PIC 9(4) COMP-5.
    05 SQL-INDEXING-MODE      PIC 9(4) COMP-5.
*
```

SQLULOAD-OUT

This structure is used to output information after a call to "sqluload - Load" on page 345.

Table 78. Fields in the SQLULOAD-OUT Structure

Field Name	Data Type	Description
SIZEOFSTRUCT	sqluint32	Size of this structure in bytes.
ROWSREAD	sqluint32	Number of records read during the load operation.
ROWSSKIPPED	sqluint32	Number of records skipped before the load operation begins.
ROWSLOADED	sqluint32	Number of rows loaded into the target table.
ROWSREJECTED	sqluint32	Number of records that could not be loaded.
ROWSDELETED	sqluint32	Number of duplicate rows deleted.
ROWSCOMMITTED	sqluint32	The total number of processed records: the number of records loaded successfully and committed to the database, plus the number of skipped and rejected records.

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLULOAD-OUT */
/* ... */
SQL_STRUCTURE sqluload_out
{
  sqluint32       sizeOfStruct;
  sqluint32       rowsRead;
  sqluint32       rowsSkipped;
  sqluint32       rowsLoaded;
  sqluint32       rowsRejected;
  sqluint32       rowsDeleted;
  sqluint32       rowsCommitted;
};
/* ... */
```

COBOL Structure

```
* File: sqlutil.cbl
01 SQLULOAD-OUT.
    05 SQL-SIZE-OF-STRUCT     PIC 9(9) COMP-5 VALUE 28.
    05 SQL-ROWS-READ          PIC 9(9) COMP-5.
    05 SQL-ROWS-SKIPPED       PIC 9(9) COMP-5.
    05 SQL-ROWS-LOADED        PIC 9(9) COMP-5.
    05 SQL-ROWS-REJECTED      PIC 9(9) COMP-5.
    05 SQL-ROWS-DELETED       PIC 9(9) COMP-5.
    05 SQL-ROWS-COMMITTED     PIC 9(9) COMP-5.
*
```

SQLUPI

This structure is used to store partitioning information, such as the partitioning map and the partitioning key of a table.

Table 79. Fields in the SQLUPI Structure

Field Name	Data Type	Description
PMAPLEN	INTEGER	The length of the partitioning map in bytes. For a single-node table, the value is `sizeof(SQL_PDB_NODE_TYPE)`. For a mult-inode table, the value is `SQL_PDB_MAP_SIZE * sizeof(SQL_PDB_NODE_TYPE)`.
PMAP	SQL_PDB_NODE_TYPE	The partitioning map.
SQLD	INTEGER	The number of used SQLPARTKEY elements; that is, the number of key parts in a partitioning key.
SQLPARTKEY	Structure	The description of a partitioning column in a partitioning key. The maximum number of partitioning columns is SQL_MAX_NUM_PART_KEYS.

Table 80 shows the SQL data types and lengths for the SQLUPI data structure. The SQLTYPE column specifies the numeric value that represents the data type of an item.

Table 80. SQL Data Types and Lengths for the SQLUPI Structure

Data type	SQLTYPE (Nulls Not Allowed)	SQLTYPE (Nulls Allowed)	SQLLEN	AIX
Date	384	385	Ignored	Yes
Time	388	389	Ignored	Yes
Timestamp	392	393	Ignored	Yes
Variable-length character string	448	449	Length of the string	Yes
Fixed-length character string	452	453	Length of the string	Yes
Long character string	456	457	Ignored	No
Null-terminated character string	460	461	Length of the string	Yes
Floating point	480	481	Ignored	Yes
Decimal	484	485	Byte 1 = precision Byte 2 = scale	Yes
Large integer	496	497	Ignored	Yes
Small integer	500	501	Ignored	Yes

Table 80. SQL Data Types and Lengths for the SQLUPI Structure (continued)

Data type	SQLTYPE (Nulls Not Allowed)	SQLTYPE (Nulls Allowed)	SQLLEN	AIX
Variable-length graphic string	464	465	Length in double-byte characters	Yes
Fixed-length graphic string	468	469	Length in double-byte characters	Yes
Long graphic string	472	473	Ignored	No

Language Syntax

C Structure

```
/* File: sqlutil.h */
/* Structure: SQLUPI */
/* ... */
SQL_STRUCTURE sqlupi
{
  unsigned short  pmaplen;
  SQL_PDB_NODE_TYPE pmap[SQL_PDB_MAP_SIZE];
  unsigned short  sqld;
  struct sqlpartkey sqlpartkey[SQL_MAX_NUM_PART_KEYS];
};
/* ... */

/* File: sqlutil.h */
/* Structure: SQLPARTKEY */
/* ... */
SQL_STRUCTURE sqlpartkey
{
  unsigned short  sqltype;
  unsigned short  sqllen;
};
/* ... */
```

SQLXA-RECOVER

Used by the transaction APIs to return information about indoubt transactions (see "Appendix B. Transaction APIs" on page 543).

Table 81. Fields in the SQLXA-RECOVER Structure

Field Name	Data Type	Description
TIMESTAMP	INTEGER	Time stamp when the transaction entered the prepared (indoubt) state. This is the number of seconds the local time zone is displaced from Coordinated Universal Time.
XID	CHAR(140)	XA identifier assigned by the transaction manager to uniquely identify a global transaction.
DBALIAS	CHAR(16)	Alias of the database where the indoubt transaction is found.
APPLID	CHAR(30)	Application identifier assigned by the database manager for this transaction.
SEQUENCE_NO	CHAR(4)	The sequence number assigned by the database manager as an extension to the *APPLID*.
AUTH_ID	CHAR(8)	ID of the user who ran the transaction.
LOG_FULL	CHAR(1)	Indicates whether this transaction caused a log full condition.
CONNECTED	CHAR(1)	Indicates whether an application is connected.
INDOUBT_STATUS	CHAR(1)	Possible values are listed below.
ORIGINATOR	CHAR(1)	Indicates whether the transaction was originated by XA or by DB2 in a partitioned database environment.
RESERVED	CHAR(9)	The first byte is used to indicate the type of indoubt transaction: `0` indicates RM, and 1 indicates TM.

Possible values for *LOGFULL* (defined in `sqlxa`) are:

SQLXA_TRUE
True

SQLXA_FALSE
False.

Possible values for *CONNECTED* (defined in `sqlxa`) are:

SQLXA_TRUE
True. The transaction is undergoing normal *syncpoint* processing, and is waiting for the second phase of the two-phase commit.

SQLXA_FALSE
False. The transaction was left indoubt by an earlier failure, and is now waiting for *re-sync* from a transaction manager.

Possible values for *INDOUBT_STATUS* (defined in `sqlxa`) are:

SQLXA_TS_PREP
Prepared

SQLXA_TS_HCOM
Heuristically committed

SQLXA_TS_HROL
Heuristically rolled back

SQLXA_TS_MACK
Missing commit acknowledgement

SQLXA_TS_END
Idle.

Language Syntax

C Structure

```
/* File: sqlxa.h */
/* Structure: SQLXA-RECOVER */
/* ... */
typedef struct sqlxa_recover_t
{
  sqluint32      timestamp;
  SQLXA_XID      xid;
  _SQLOLDCHAR    dbalias[SQLXA_DBNAME_SZ];
  _SQLOLDCHAR    applid[SQLXA_APPLID_SZ];
  _SQLOLDCHAR    sequence_no[SQLXA_SEQ_SZ];
  _SQLOLDCHAR    auth_id[SQLXA_USERID_SZ];
  char           log_full;
  char           connected;
  char           indoubt_status;
  char           originator;
  char           reserved[8];
} SQLXA_RECOVER;
/* ... */
```

SQLXA-XID

Used by the transaction APIs to identify XA transactions (see "Appendix B. Transaction APIs" on page 543).

Table 82. Fields in the SQLXA-XID Structure

Field Name	Data Type	Description
FORMATID	INTEGER	XA format ID.
GTRID_LENGTH	INTEGER	Length of the global transaction ID.
BQUAL_LENGTH	INTEGER	Length of the branch identifier.
DATA	CHAR[128]	GTRID, followed by BQUAL and trailing blanks, for a total of 128 bytes.
Note: The maximum size for GTRID and BQUAL is 64 bytes each.		

Language Syntax

C Structure

```
/* File: sqlxa.h */
/* Structure: SQLXA-XID */
/* ... */
typedef struct sqlxa_xid_t SQLXA_XID;
/* ... */

/* File: sqlxa.h */
/* Structure: SQLXA-XID-T */
/* ... */
struct sqlxa_xid_t
{
  sqlint32 formatID;
  sqlint32 gtrid_length;
  sqlint32 bqual_length;
  char data[SQLXA_XIDDATASIZE];
};
/* ... */
```

Appendix A. Naming Conventions

This section provides information about the conventions that apply when naming database manager objects, such as databases and tables, and authentication IDs.

- Character strings that represent names of database manager objects can contain any of the following: a-z, A-Z, 0-9, @, #, and $.
- The first character in the string must be an alphabetic character, @, #, or $; it cannot be a number or the letter sequences SYS, DBM, or IBM.
- Unless otherwise noted, names can be entered in lowercase letters; however, the database manager processes them as if they were uppercase.

  The exception to this is character strings that represent names under the systems network architecture (SNA). Many values, such as logical unit names (partner_lu and local_lu), are case sensitive. The name must be entered exactly as it appears in the SNA definitions that correspond to those terms.
- A database name or database alias is a unique character string containing from one to eight letters, numbers, or keyboard characters from the set described above.

  Databases are cataloged in the system and local database directories by their aliases in one field, and their original name in another. For most functions, the database manager uses the name entered in the alias field of the database directories. (The exceptions are CHANGE DATABASE COMMENT and CREATE DATABASE, where a directory path must be specified.)
- The name or the alias name of a table or a view is an SQL identifier that is a unique character string 1 to 128 characters in length. Column names can be 1 to 30 characters in length.

  A fully qualified table name consists of the *schema.tablename*. The schema is the unique user ID under which the table was created. The schema name for a declared temporary table must be SESSION.
- Authentication IDs cannot exceed 30 characters on Windows 32-bit operating systems and 8 characters on all other operating systems.
- Group IDs cannot exceed 8 characters in length.
- Local aliases for remote nodes that are to be cataloged in the node directory cannot exceed eight characters in length.

For more information about naming conventions, see the *Administration Guide*. For more information about length limits for all DB2 identifiers, see the *SQL Reference*.

Appendix B. Transaction APIs

Databases can be used in a distributed transaction processing (DTP) environment; for information about this topic and heuristic operations, see the *Administration Guide*.

Heuristic APIs

A set of APIs is provided for tool writers to perform heuristic functions on indoubt transactions when the resource owner (such as the database administrator) cannot wait for the Transaction Manager (TM) to perform the *re-sync* action. This condition may occur if, for example, the communication line is broken, and an indoubt transaction is tying up needed resources. For the database manager, these resources include locks on tables and indexes, log space, and storage used by the transaction. Each indoubt transaction also decreases, by one, the maximum number of concurrent transactions that could be processed by the database manager.

The heuristic APIs have the capability to query, commit, and roll back indoubt transactions, and to cancel transactions that have been heuristically committed or rolled back, by removing the log records and releasing log pages.

Attention: The heuristic APIs should be used with caution and only as a last resort. The TM should drive the re-sync events. If the TM has an operator command to start the re-sync action, it should be used. If the user cannot wait for a TM-initiated re-sync, heuristic actions are necessary.

Although there is no set way to perform these actions, the following guidelines may be helpful:

- Use the **sqlxphqr** function to display the indoubt transactions. They have a status = 'P' (prepared), and are not connected. The *gtrid* portion of an *xid* is the global transaction ID that is identical to that in other resource managers (RM) that participate in the global transaction.
- Use knowledge of the application and the operating environment to identify the other participating RMs.
- If the transaction manager is CICS, and the only RM is a CICS resource, perform a heuristic rollback.
- If the transaction manager is not CICS, use it to determine the status of the transaction that has the same *gtrid* as does the indoubt transaction.
- If at least one RM has committed or rolled back, perform a heuristic commit or a rollback.

- If they are all in the prepared state, perform a heuristic rollback.
- If at least one RM is not available, perform a heuristic rollback.

If the transaction manager is available, and the indoubt transaction is due to the RM not being available in the second phase, or in an earlier re-sync, the DBA should determine from the TM's log what action has been taken against the other RMs, and then do the same. The *gtrid* is the matching key between the TM and the RMs.

Do not execute "sqlxhfrg - Forget Transaction Status" on page 545 unless a heuristically committed or rolled back transaction happens to cause a log full condition. The forget function releases the log space occupied by this indoubt transaction. If a transaction manager eventually performs a re-sync action for this indoubt transaction, the TM could make the wrong decision to commit or to roll back other RMs, because no record was found in this RM. In general, a missing record implies that the RM has rolled back.

sqlxhfrg - Forget Transaction Status

Permits the RM to erase knowledge of a heuristically completed transaction (that is, one that has been committed or rolled back heuristically).

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqlxa.h

C API Syntax

```
/* File: sqlxa.h */
/* API: Forget Transaction Status */
/* ... */
extern int SQL_API_FN sqlxhfrg(
   SQLXA_XID           *pTransId,
   struct sqlca        *pSqlca
   );
/* ... */
```

API Parameters

pTransId
Input. XA identifier of the transaction to be heuristically forgotten, or removed from the database log.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

Only transactions with a status of *heuristically committed* or *rolled back* can have the FORGET operation applied to them.

For information about the *SQLXA_XID* structure, see "SQLXA-XID" on page 540.

sqlxphcm - Commit an Indoubt Transaction

Commits an indoubt transaction (that is, a transaction that is prepared to be committed). If the operation succeeds, the transaction's state becomes *heuristically committed*.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqlxa.h

C API Syntax

```
/* File: sqlxa.h */
/* API: Commit an Indoubt Transaction */
/* ... */
extern int SQL_API_FN sqlxphcm(
   int                  exe_type,
   SQLXA_XID            *pTransId,
   struct sqlca         *pSqlca
   );
/* ... */
```

API Parameters

exe_type
Input. If `EXE_THIS_NODE` is specified, the operation is executed only at this node.

pTransId
Input. XA identifier of the transaction to be heuristically committed.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

Only transactions with a status of *prepared* can be committed. Once heuristically committed, the database manager remembers the state of the transaction until "sqlxhfrg - Forget Transaction Status" on page 545 is issued.

For information about the *SQLXA_XID* structure, see "SQLXA-XID" on page 540 .

sqlxphqr - List Indoubt Transactions

Gets a list of all indoubt transactions for the currently connected database.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqlxa.h

C API Syntax

```
/* File: sqlxa.h */
/* API: List Indoubt Transactions */
/* ... */
extern int SQL_API_FN sqlxphqr(
   int                  exe_type,
   SQLXA_RECOVER        **ppIndoubtData,
   sqlint32             *pNumIndoubts,
   struct sqlca         *pSqlca
   );
/* ... */
```

API Parameters

exe_type
Input. If EXE_THIS_NODE is specified, the operation is executed only at this node.

ppIndoubtData
Output. Supply the address of a pointer to an *SQLXA_RECOVER* structure to hold the indoubt transactions. This API allocates sufficient space to hold the list of indoubt transactions, and returns a pointer to this space. The space is released only when the process terminates. Do not use "sqlefmem - Free Memory" on page 195 to free this memory, since it contains pointers to other dynamically allocated structures which will not be freed. For more information, see "SQLXA-RECOVER" on page 538.

pNumIndoubts
Output. The API will return the number of indoubt transactions returned in *ppIndoubtData*.

pSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqlxphrl - Roll Back an Indoubt Transaction

Rolls back an indoubt transaction (that is, a transaction that has been prepared). If the operation succeeds, the transaction's state becomes *heuristically rolled back*.

Scope

This API only affects the node on which it is issued.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqlxa.h

C API Syntax

```
/* File: sqlxa.h */
/* API: Roll Back an Indoubt Transaction */
/* ... */
extern int SQL_API_FN sqlxphrl(
   int                  exe_type,
   SQLXA_XID            *pTransId,
   struct sqlca         *pSqlca
   );
/* ... */
```

API Parameters

exe_type
Input. If `EXE_THIS_NODE` is specified, the operation is executed only at this node.

pTransId
Input. XA identifier of the transaction to be heuristically rolled back.

pSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

Only transactions with a status of *prepared* or *idle* can be rolled back. Once heuristically rolled back, the database manager remembers the state of the transaction until "sqlxhfrg - Forget Transaction Status" on page 545 is issued.

For information about the *SQLXA_XID* structure, see "SQLXA-XID" on page 540 .

Appendix C. Precompiler Customization APIs

There is a set of precompiler service APIs which enable the customization of precompilers. Information about what these APIs are, and how to use them, is available from an anonymous FTP site called **ftp://ftp.software.ibm.com**. The PostScript file, called `prepapi.psbin`, is located in the directory `/ps/products/db2/info`. This file is in binary format.

If you do not have access to this electronic forum and would like to get a copy of the document, you can call IBM Service as described in the *Service Information Flyer*.

For more generic information about what is available on the Internet, or how to access it, see "Contacting IBM" on page 671.

Appendix D. Backup and Restore APIs for Vendor Products

DB2 provides interfaces that can be used by third-party media management products to store and retrieve data for backup and restore operations. This function is designed to augment the backup and restore data targets of diskette, disk, tape, and Tivoli Storage Manager, that are supported as a standard part of DB2.

These third-party media management products will be referred to as vendor products in the remainder of this appendix.

DB2 defines a set of function prototypes that provide a general purpose data interface to backup and restore that can be used by many vendors. These functions are to be provided by the vendor in a shared library on UNIX based systems, or DLL on OS/2 or the Windows operating system. When the functions are invoked by DB2, the shared library or DLL specified by the calling backup or restore routine is loaded and the functions provided by the vendor are called to perform the required tasks.

This appendix is divided into four parts:

- Operational overview of DB2's interaction with vendor products.
- Detailed descriptions of DB2's vendor APIs.
- Information on the data structures used in the API calls.
- Details on invoking backup and restore using vendor products.

Operational Overview

Five functions are defined to interface DB2 and the vendor product:

- sqluvint - Initialize and Link to Device
- sqluvget - Reading Data from Device
- sqluvput - Writing Data to Device
- sqluvend - Unlink the Device
- sqluvdel - Delete Committed Session

DB2 will call these functions, and they should be provided by the vendor product in a shared library on UNIX based systems, or in a DLL on OS/2 or the Windows operating system.

Note: The shared library or DLL code will be run as part of the database engine code. Therefore, it must be reentrant and thoroughly debugged. An errant function may compromise data integrity of the database.

The sequence of functions that DB2 will call in a specific backup or restore session depends on these factors:

- The number of sessions that will be utilized (one or more)?
- Whether it is a backup or a restore.
- The PROMPTING mode that is specified on the backup or restore.
- The characteristics of the device that the data is stored on.
- Any errors encountered during the operation.

Number of Sessions

DB2 supports the backup and restore of database objects using one or more data streams or sessions. A backup or restore using three sessions would require three physical or logical devices to be available. When vendor device support is being used, it is the vendor's functions that are responsible for managing the interface to each physical or logical device. DB2 simply sends or receives data buffers to or from the vendor provided functions.

The number of sessions to be used is specified as a parameter by the application that calls the backup or restore database function. This value is provided in the INIT-INPUT structure used by **sqluvint** (see "sqluvint - Initialize and Link to Device" on page 564).

DB2 will continue to initialize sessions until the specified number is reached, or it receives an SQLUV_MAX_LINK_GRANT warning return code from an **sqluvint** call. In order to warn DB2 that it has reached the maximum number of sessions that it can support, the vendor product will require code to track the number of active sessions. Failure to warn DB2 could lead to a DB2 initialize session request that fails, resulting in a termination of all sessions and the failure of the entire backup or restore operation.

When the operation is backup, DB2 writes a media header record at the beginning of each session. It contains information that DB2 utilizes to identify the session during a restore. DB2 uniquely identifies each session by appending a sequence number to the name of the backup. It starts at 1 (one) for the first session and is incremented by one each time another session is initiated with an **sqluvint** call for a backup or restore operation. For more details, see "INIT-INPUT" on page 583.

When the backup is successfully completed, DB2 writes a media trailer to the last session it closes. This trailer includes information that tells DB2 how

many sessions were used to perform the backup. During restore, this information is used to ensure all the sessions, or data streams, have been restored.

Operation with No Errors, Warnings or Prompting

For backup, the following sequence of calls will be issued by DB2 for **each** session.

```
sqluvint, action = SQLUV_WRITE
```

followed by 1 to n

```
sqluvput
```

followed by 1

```
sqluvend, action = SQLUV_COMMIT
```

When DB2 issues an **sqluvend** call (action SQLUV_COMMIT), it expects the vendor product to appropriately save the output data. A return code of SQLUV_OK to DB2 indicates success.

The DB2-INFO structure, used on the **sqluvint** call, contains the information required to identify the backup (see "DB2-INFO" on page 579). A sequence number is supplied. The vendor product may choose to save this information. DB2 will use it during restore to identify the backup that will be restored.

For restore, the sequence of calls for each session is:

```
sqluvint, action = SQLUV_READ
```

followed by 1 to n

```
sqluvget
```

followed by 1

```
sqluvend, action = SQLUV_COMMIT
```

The information in the DB2-INFO structure used on the **sqluvint** call will contain the information required to identify the backup. Sequence number is not supplied. DB2 expects that all backup objects (session outputs committed during backup) will be returned. The first backup object returned is the object generated with sequence number 1, and all other objects are restored in no specific order. DB2 checks the media tail to ensure that all objects have been processed.

Note: Not all vendor products will keep a record of the names of the backup objects. This is most likely when the backups are being done to tapes, or other media of limited capacity. During the initialization of restore sessions, the identification information can be utilized to stage the

necessary backup objects so that they are available when required; this may be most useful when juke boxes or robotic systems are used to store the backups. DB2 will always check the media header (first record in each session's output) to ensure that the correct data is being restored.

PROMPTING Mode

When a backup or restore is initiated, two prompting modes are possible:

- WITHOUT PROMPTING or NOINTERRUPT where there is no opportunity for the vendor product to write messages to the user, or for the user to respond to them.
- PROMPTING or INTERRUPT where the user can receive and respond to messages from the vendor product.

For PROMPTING mode, backup and restore define three possible user responses:

- Continue

  The operation of writing or reading data to the device will resume.
- Device terminate

  The device will receive no additional data and the session is terminated.
- Terminate

  The entire backup or restore operation is terminated.

The use of the PROMPTING and WITHOUT PROMPTING modes is discussed in the sections that follow.

Device Characteristics

For the purposes of the vendor device support APIs, two general types of devices are defined:

- Limited capacity devices requiring user action to change the media, for example, a tape drive, diskette, or CDROM drive.
- Very large capacity devices where normal operations do not require the user be involved with handling media; for example, a juke box, or an intelligent, robotic media handling device.

A limited capacity device may require that the user be prompted to load additional media during the backup or restore operation. Generally DB2 is not sensitive to the order in which the media is loaded for either backup or restore. It also provides facilities to pass vendor media handling messages to the user. This prompting requires that the backup or restore operation be initiated with PROMPTING on. The media handling message text is specified in the description field of the return code structure.

If **PROMPTING** is on and DB2 receives an SQLUV_ENDOFMEDIA or an SQLUV_ENDOFMEDIA_NO_DATA return code from a **sqluvput** (write) or **sqluvget** (read) call, then DB2 will:

- Mark the last buffer sent to the session to be resent, if the call was **sqluvput**. It will be put to a session later.
- Call the session with **sqluvend** (action = SQLUV_COMMIT). If successful (SQLUV_OK return code), DB2 will:
  - Write a message to the user containing a vendor media handling message from the return code structure that signaled end-of-media.
  - Prompt the user for a continue, device terminate, or terminate response.

Based on the user response, DB2 will:

- If **continue**, DB2 will initialize another session using the **sqluvint** call, and when successful, begin writing data to or reading data from the session. To identify the session uniquely when writing, DB2 increments the sequence number. The sequence number is available in the DB2-INFO structure used with **sqluvint**, and is in the media header record, which is the first data record sent to the session.

  DB2 will not start more sessions than requested when backup or restore is started or indicated by the vendor product with a SQLUV_MAX_LINK_GRANT warning on an **sqluvint**.
- If **device terminate**, DB2 will not attempt to initialize another session, and the number of active session will be reduced by one. DB2 will not allow all sessions to be terminated by device terminate responses; at least one must be kept active until the backup or restore operation completes (for example, all data is processed).
- If **terminate**, DB2 will terminate the backup or restore operation. For more information on exactly what DB2 does to terminate the sessions, see "If Error Conditions Are Returned to DB2" on page 560.

Since the performance of backup or restore is often dependent on the number of devices being used, it is important that parallelism be maintained. For backup, users should be encouraged to respond to the prompting with a continue, unless they know that the remaining active sessions will hold the data that is still to be written out. For restore, users should use the continue response until all media have been processed or are being processed (for example, all the tapes have been read or are being read).

If the backup or restore mode is **WITHOUT PROMPTING** and DB2 receives an SQLUV_ENDOFMEDIA or an SQLUV_ENDOFMEDIA_NO_DATA return code from a session, it will terminate the session and not attempt to open another session. If all sessions return end-of-media to DB2 before the backup or restore is complete, then the backup or restore operation will fail. Because

of this, WITHOUT PROMPTING should be used carefully with limited capacity devices. However, it makes sense to operate in this mode with very large capacity devices.

It is possible for the vendor product to hide media mounting and switching actions from DB2, so that the device appears to have infinite capacity. Some very large capacity devices operate in this mode. In these cases, it is critical that all the data that was backed up be returned to DB2 in the same order when a restore operation is in progress. Failure to do so could result in missing data, but DB2 would assume a successful restore operation, since it has no way of detecting the missing data.

DB2 writes data to the vendor product with the assumption that each buffer will be contained on one and only one media (for example, a tape). It is possible for the vendor product to split these buffers across multiple media without DB2's knowledge. In these cases, the order in which the media is processed during a restore is critical, since the vendor product will be responsible for returning reconstructed buffers from the multiple media to DB2. Failure to do so will result in a failure of the restore operation.

If Error Conditions Are Returned to DB2

When performing a backup or restore operation, DB2 expects that all sessions will complete successfully, or the entire backup or restore operation fails. A session signals completed correctly (for example, committed) to DB2 with an SQLUV_OK return code on the call **sqluvend**, action = SQLUV_COMMIT.

If unrecoverable errors are encountered, the session will be terminated by DB2. These can be DB2 errors, or errors returned to DB2 from the vendor product. Since all sessions must commit successfully to have a complete backup or restore, the failure of one will cause DB2 to terminate the other sessions associated with the operation.

If the vendor product decides to respond to a call from DB2 with an unrecoverable return code, the vendor product can optionally provide additional information to the user using message text placed in the description field of the RETURN-CODE structure. This message text will be presented to the user along with the DB2 information, so that corrective action may be taken.

There will be backup scenarios where a session has committed successfully, and another session associated with the backup operation experiences an unrecoverable error. Since all sessions must complete successfully before a backup operation is successful, DB2 must delete the output data in the committed sessions: DB2 issues a **sqluvdel** call to request deletion of the

object. This call is not considered an I/O session, and is responsible for initializing and terminating any connection that may be necessary to delete the backup object.

The information in the DB2-INFO structure will not contain a sequence number; **sqluvdel** will delete all backup objects that match the remaining parameters in the DB2-INFO structure.

Warning Conditions

It is possible for DB2 to receive warning return codes from the vendor product; for example, under the condition that a device is not ready or some other correctable condition has occurred. This is true for both read and write operations.

On the **sqluvput** and **sqluvget** calls, the vendor can set the return code to SQLUV_WARNING and optionally provide additional information to the user using message text placed in the description field of the return code structure. This message text will be presented to the user, so that corrective action may be taken. Again the user can respond in one of three ways: continue, device terminate, or terminate. The mechanism used to accomplish communication with the user is the same as for end-of-media conditions.

DB2's actions will be:

- For continue, DB2 will attempt to rewrite the buffer using **sqluvput** if the operation is backup. If the operation is restore, DB2 will issue an **sqluvget** call, to read the next buffer.
- For device terminate or terminate, DB2 will terminate the entire backup or restore in the same way that it would for an unrecoverable error (for example, terminate active sessions and delete committed sessions).

Details about possible return codes for each function call and DB2 reactions are specified in the following API sections.

Operational Hints and Tips

This section provides some hints and tips when building vendor products.

Recovery History File

A recovery history file can be used as an aid in database recovery operations. It is associated with each database and is automatically updated with each backup or restore operation. A general overview of the file is provided in the *Administration Guide*. The information in the file can be viewed, updated and pruned through the following facilities:

- Control Center
- Command Line Processor

  - LIST HISTORY
  - PRUNE HISTORY
  - UPDATE RECOVERY HISTORY FILE
- APIs
  - sqluhcls, sqluhgne, slquhops, sqluhprn, and sqluhupd.

For information about the layout of the file, see "db2HistData" on page 423.

When a backup operation completes, a record or records are written to the file. If the output of the backup operation was directed to vendor devices, the DEVICE field in the history record will contain a `0`, and the LOCATION field will contain either:

- The vendor file name supplied when the backup was invoked.
- The name of the shared library if there was no vendor file name supplied when the backup was invoked.

See "Invoking Backup/Restore Using Vendor Products" on page 588 for more details about specifying this option. If the vendor file name is not specified, LOCATION will be blank.

The LOCATION field can be updated using any of the above facilities. This capability can be utilized to update the location of the backup information if limited capacity devices (for example, removable media) have been used to hold the backup, and the media is physically moved to a different storage location (for example, off-site). If this is done, then this file can be utilized to assist in locating a backup when a recovery is necessary.

Functions and Data Structures

The following sections describe the generic functions and data structures available for use by the vendor products.

The APIs for vendor products are:

- "sqluvint - Initialize and Link to Device" on page 564
- "sqluvget - Reading Data from Device" on page 568
- "sqluvput - Writing Data to Device" on page 571
- "sqluvend - Unlink the Device and Release its Resources" on page 574
- "sqluvdel - Delete Committed Session" on page 577

The data structures used by the vendor APIs are:

"DB2-INFO" on page 579
Contains information identifying DB2 to the vendor device.

sqluvint - Initialize and Link to Device

This function is called to provide information for initialization and establishment of a logical link between DB2 and the vendor device.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sql.h

C API Syntax

```
/* File: sqluvend.h */
/* API: Initialize and Link to Device */
/* ... */
int sqluvint (
  struct Init_input   *,
  struct Init_output  *,
  struct Return_code  *);
/* ... */
```

API Parameters

Init_input
Input. Structure that contains information provided by DB2 to establish a logical link with the vendor device.

Init_output
Output. Structure that contains the output returned by the vendor device.

Return_code
Output. Structure that contains the return code to be passed to DB2, and a brief text explanation.

Usage Notes

For each media I/O session, DB2 will call this function to obtain a device handle. If for any reason, the vendor function encounters an error during initialization, it will indicate it via a return code. If the return code indicates an error, DB2 may choose to terminate the operation by calling the **sqluvend** function. Details on possible return codes, and the DB2 reaction to each of these, is contained in the return codes table (see Table 83 on page 565).

The INIT-INPUT structure contains elements that can be used by the vendor product to determine if the backup or restore can proceed:

- size_HI_order and size_LOW_order

  This is the estimated size of the backup. They can be used to determine if the vendor devices can handle the size of the backup image. They can be used to estimate the quantity of removable media that will be required to hold the backup. It might be beneficial to fail at the first **sqluvint** call if problems are anticipated.
- req_sessions

  The number of user requested sessions can be used in conjunction with the estimated size and the prompting level to determine if the backup or restore operation is possible.
- prompt_lvl

  The prompting level indicates to the vendor if it is possible to prompt for actions such as changing removable media (for example, put another tape in the tape drive). This might suggest that the operation cannot proceed since there will be no way to prompt the user.

  If the prompting level is WITHOUT PROMPTING and the quantity of removable media is greater than the number of sessions requested, DB2 will not be able to complete the operation successfully (see "PROMPTING Mode" on page 558 and "Device Characteristics" on page 558 for more information).

DB2 names the backup being written or the restore to be read via fields in the DB2-INFO structure. In the case of an action = SQLUV_READ, the vendor product must check for the existence of the named object. If it cannot be found, the return code should be set to SQLUV_OBJ_NOT_FOUND so that DB2 will take the appropriate action.

After initialization is completed successfully, DB2 will continue by issuing other data transfer functions, but may terminate the session at any time with an **sqluvend** call.

Return Codes

Table 83. Valid Return Codes for sqluvint and Resulting DB2 Action

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_OK	Operation successful.	sqluvput, sqluvget (see comments)	If action = SQLUV_WRITE, the next call will be sqluvput (to BACKUP data). If action = SQLUV_READ, verify the existence of the named object prior to returning SQLUV_OK; the next call will be sqluvget to RESTORE data.
SQLUV_LINK_EXIST	Session activated previously.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.

Table 83. Valid Return Codes for sqluvint and Resulting DB2 Action (continued)

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_COMM_ ERROR	Communication error with device.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INV_VERSION	The DB2 and vendor products are incompatible.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INV_ACTION	Invalid action is requested. This could also be used to indicate that the combination of parameters results in an operation which is not possible.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_NO_DEV_ AVAIL	No device is available for use at the moment.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_OBJ_NOT_ FOUND	Object specified cannot be found. This should be used when the action on the sqluvint call is 'R' (read) and the requested object cannot be found based on the criteria specified in the DB2-INFO structure.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_OBJS_FOUND	More than 1 object matches the specified criteria. This will result when the action on the sqluvint call is 'R' (read) and more than one object matches the criteria in the DB2-INFO structure.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INV_USERID	Invalid userid specified.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INV_ PASSWORD	Invalid password provided.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INV_OPTIONS	Invalid options encountered in the vendor options field.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_INIT_FAILED	Initialization failed and the session is to be terminated.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_DEV_ERROR	Device error.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.

Table 83. Valid Return Codes for sqluvint and Resulting DB2 Action (continued)

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_MAX_LINK_ GRANT	Max number of links established.	sqluvput, sqluvget (see comments)	This is treated as a warning by DB2. The warning tells DB2 not to open additional sessions with the vendor product, because the maximum number of sessions it can support has been reached (note: this could be due to device availability). If action = SQLUV_WRITE (BACKUP), the next call will be sqluvput. If action = SQLUV_READ, verify the existence of the named object prior to returning SQLUV_MAX_LINK_GRANT; the next call will be sqluvget to RESTORE data.
SQLUV_IO_ERROR	I/O error.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.
SQLUV_NOT_ ENOUGH_SPACE	There is not enough space to store the entire backup image; the size estimate is provided as a 64 bit value in bytes.	no further calls	Session initialization fails. Free up memory allocated for this session and terminate. A sqluvend call will not be received, since the session was never established.

sqluvget - Reading Data from Device

After initialization, this function can be called to read data from the device.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqluvend.h

C API Syntax

```
/* File: sqluvend.h */
/* API: Reading Data from Device */
/* ... */
int sqluvget (
  void * pVendorCB,
  struct Data         *,
  struct Return_code  *);
/* ... */

typedef struct Data
}
   sqlint32  obj_num;
   sqlint32  buff_size;
   sqlint32  actual_buff_size;
   void      *dataptr;
   void      *reserve;
{ Data;
```

API Parameters

pVendorCB
Input. Pointer to space allocated for the DATA structure (including the data buffer) and Return_code.

Data Input/output. A pointer to the *data* structure.

Return_code
Output. The return code from the API call.

obj_num
Specifies which backup object should be retrieved.

buff_size
Specifies the buffer size to be used.

actual_buff_size
Specifies the actual bytes read or written. This value should be set to output to indicate how many bytes of data were actually read.

dataptr
A pointer to the data buffer.

reserve
A reserve for future use.

Usage Notes

This is used by the restore function.

Return Codes

Table 84. Valid Return Codes for sqluvget and Resulting DB2 Action

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_OK	Operation successful.	sqluvget	DB2 processes the data
SQLUV_COMM_ERROR	Communication error with device.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_ACTION	Invalid action is requested.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_DEV_HANDLE	Invalid device handle.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_BUFF_SIZE	Invalid buffer size specified.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_DEV_ERROR	Device error.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_WARNING	Warning. This should not be used to indicate end-of-media to DB2; use SQLUV_ENDOFMEDIA or SQLUV_ENDOFMEDIA_NO_DATA for this purpose. However, device not ready conditions can be indicated using this return code.	sqluvget, or sqluvend, action =SQLU_ABORT	See the explanation of DB2's handling of warnings ("Warning Conditions" on page 561).
SQLUV_LINK_NOT_EXIST	No link currently exists.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_MORE_DATA	Operation successful; more data available.	sqluvget	
SQLUV_ENDOFMEDIA_NO_DATA	End of media and 0 bytes read (for example, end of tape).	sqluvend	See the explanation of DB2's handling of end-of-media conditions under "PROMPTING Mode" on page 558, and "Device Characteristics" on page 558.
SQLUV_ENDOFMEDIA	End of media and > 0 bytes read, (for example, end of tape).	sqluvend	DB2 processes the data, and then handles the end-of-media condition as described under "PROMPTING Mode" on page 558, and "Device Characteristics" on page 558.

Table 84. Valid Return Codes for sqluvget and Resulting DB2 Action (continued)

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_IO_ERROR	I/O error.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.

Next call:

- [a] If the next call will be an sqluvend, action = SQLU_ABORT, this session will be terminated. In addition, all other active sessions are terminated with sqluvend, action = SQLU_ABORT.

sqluvput - Writing Data to Device

After initialization, this function can be used to write data to the device.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqluvend.h

C API Syntax

```
/* File: sqluvend.h */
/* API: Writing Data to Device */
/* ... */
int sqluvput (
  void * pVendorCB,
  struct Data  *,
  struct Return_code  *);
/* ... */

typedef struct Data
}
   sqlint32  obj_num;
   sqlint32  buff_size;
   sqlint32  actual_buff_size;
   void      *dataptr;
   void      *reserve;
{ Data;
```

API Parameters

pVendorCB
Input. Pointer to space allocated for the DATA structure (including the data buffer) and Return_code.

Data Output. Data buffer filled with data to be written out.

Return_code
Output. The return code from the API call.

obj_num
Specifies which backup object should be retrieved.

buff_size
Specifies the buffer size to be used.

actual_buff_size
Specifies the actual bytes read or written. This value should be set to output to indicate how many bytes of data were actually read.

dataptr
A pointer to the data buffer.

reserve
A reserve for future use.

Usage Notes

This is used in the backup function.

Return Codes

Table 85. Valid Return Codes for sqluvput and Resulting DB2 Action

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_OK	Operation successful.	sqluvput or sqluvend, if complete (for example, DB2 has no more data)	Inform other processes of successful operation.
SQLUV_COMM_ERROR	Communication error with device.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_ACTION	Invalid action is requested.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_DEV_HANDLE	Invalid device handle.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_INV_BUFF_SIZE	Invalid buffer size specified.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_ENDOFMEDIA	End of media reached, for example, end of tape.	sqluvend	See the explanation of DB2's handling of end-of-media conditions under "PROMPTING Mode" on page 558, and "Device Characteristics" on page 558.
SQLUV_DATA_RESEND	Device requested to have buffer sent again.	sqluvput	DB2 will retransmit the last buffer. This will only be done once.
SQLUV_DEV_ERROR	Device error.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_WARNING	Warning. This should not be used to indicate end-of-media to DB2; use SQLUV_ENDOFMEDIA for this purpose. However, device not ready conditions can be indicated using this return code.	sqluvput	See the explanation of DB2's handling of warnings in "Warning Conditions" on page 561.
SQLUV_LINK_NOT_EXIST	No link currently exists.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.
SQLUV_IO_ERROR	I/O error.	sqluvend, action = SQLU_ABORT[a]	The session will be terminated.

Table 85. Valid Return Codes for sqluvput and Resulting DB2 Action (continued)

Literal in Header File	Description	Probable Next Call	Other Comments
Next call: • [a] If the next call will be an sqluvend, action = SQLU_ABORT, this session will be terminated. In addition, all other active sessions are terminated with sqluvend, action = SQLU_ABORT. Committed sessions are deleted with an sqluvint, sqluvdel, and sqluvend sequence of calls (see "If Error Conditions Are Returned to DB2" on page 560).			

sqluvend - Unlink the Device and Release its Resources

Ends or unlinks the device, and frees all its related resources. The vendor has to free or release unused resources before returning to DB2 (for example, allocated space and file handles).

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sql.h

C API Syntax

```
/* File: sqluvend.h */
/* API: Unlink the Device and Release its Resources */
/* ... */
int sqluvend (
  sqlint32 action,
  void * pVendorCB,
  struct Init_output  *,
  struct Return_code  *);
/* ... */
```

API Parameters

action Input. Used to commit or abort the session:

- SQLUV_COMMIT (0 = to commit)
- SQLUV_ABORT (1 = to abort)

pVendorCB
Input. Pointer to the Init_output structure.

Init_output
Output. Space for Init_output de-allocated. The data has been committed to stable storage for a backup if action is to commit. The data is purged for a backup if the action is to abort.

Return code
Output. The return code from the API call.

Usage Notes

This function will be called for each session opened.

There are two possible action codes:

- Commit

  Output of data to this session, or the reading of data from the session, is complete.

  For a write (BACKUP) session, if the vendor returns to DB2 with a return code of SQLUV_OK, DB2 will assume that the output data has been appropriately saved by the vendor's product, and can be accessed if referenced in a later **sqluvint** call.

  For a read (RESTORE) session, if the vendor returns to DB2 with a return code of SQLUV_OK, the data should not be deleted, because it may be needed again.

  If the vendor returns SQLUV_COMMIT_FAILED, DB2 must assume that there are problems with the entire backup or restore. All active sessions will be terminated by **sqluvend** calls with action = SQLUV_ABORT. For a backup operation, committed sessions will receive a **sqluvint**, **sqluvdel**, and **sqluvend** sequence of calls (see "If Error Conditions Are Returned to DB2" on page 560).

- Abort

  A problem has been encountered by DB2, and there will be no more reading of data or writing of data to the session.

  For a write (BACKUP) session, the vendor should delete the partial output dataset, and use a SQLUV_OK return code if the partial output is deleted. Also, DB2 assumes that there are problems with the entire backup. All active sessions will be terminated by **sqluvend** calls with action = SQLUV_ABORT, and committed sessions will receive a **sqluvint**, **sqluvdel**, and **sqluvend** sequence of calls (see "If Error Conditions Are Returned to DB2" on page 560).

  For a read (RESTORE) session, the vendor should not delete the data (because it may be needed again), but should clean up and return to DB2 with a SQLUV_OK return code. DB2 will terminate all the restore sessions by sqluvend calls with action = SQLUV_ABORT. If the vendor returns SQLUV_ABORT_FAILED to DB2, the caller will not be notified of this error, because DB2 returns the first fatal failure and ignores subsequent failures. In this case, for DB2 to have called sqluvend with action = SQLUV_ABORT, an initial fatal error must have occurred.

Return Codes

Table 86. Valid Return Codes for sqluvend and Resulting DB2 Action

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_OK	Operation successful.	no further calls	Free all memory allocated for this session and terminate.
SQLUV_COMMIT_FAILED	Commit request failed.	no further calls	Free all memory allocated for this session and terminate.
SQLUV_ABORT_FAILED	Abort request failed.	no further calls	

sqluvdel - Delete Committed Session

Deletes committed sessions.

Authorization

One of the following:

- *sysadm*
- *dbadm*

Required Connection

Database

API Include File

sqluvend.h

C API Syntax

```
/* File: sqluvend.h */
/* API: Delete Committed Session */
/* ... */
int sqluvdel (
  struct Init_input   *,
  struct Init_output  *,
  struct Return_code  *);
/* ... */
```

API Parameters

Init_input
Input. Space allocated for Init_input and Return_code.

Return_code
Output. Return code from the API call. The object pointed to by the Init_input structure is deleted.

Usage Notes

If multiple sessions are opened, and some sessions are committed but one of them fails, this function is called to delete the committed sessions. No sequence number will be specified; **sqluvdel** is responsible for finding all the objects that were created during a pacticular backup and deleting them. Information in the INIT-INPUT structure is utilized to identify the output data to be deleted. The call to **sqluvdel** is responsible for establishing any connection or session that is required to delete a backup object from the vendor device. If the return code from this call is SQLUV_DELETE_FAILED, DB2 will not notify the caller of this error, because DB2 returns the first fatal failure and ignores subsequent failures. In this case, for DB2 to have called **sqluvdel**, an initial fatal error must have occurred.

Return Codes

Table 87. Valid Return Codes for sqluvdel and Resulting DB2 Action

Literal in Header File	Description	Probable Next Call	Other Comments
SQLUV_OK	Operation successful.	no further calls	
SQLUV_DELETE_FAILED	Delete request failed.	no further calls	

DB2-INFO

This structure contains information provided by DB2 to identify itself to the vendor device.

Note: All fields are NULL terminated strings.

Table 88. Fields in the DB2-INFO Structure

Field Name	Data Type	Description
DB2_id	char	An identifier for the DB2 product. Maximum length of string it points to is 8 characters.
version	char	The current version of the DB2 product. Maximum length of string it points to is 8 characters.
release	char	The current release of the DB2 product. Set to NULL if it is insignificant. Maximum length of string it points to is 8 characters.
level	char	The current level of the DB2 product. Set to NULL if it is insignificant. Maximum length of string it points to is 8 characters.
action	char	Specifies the action to be taken. Maximum length of string it points to is 1 character.
filename	char	The file name used to identify the backup image. If it is NULL, the *server_id*, *db2instance*, *dbname*, and *timestamp* will uniquely identify the backup image. Maximum length of string it points to is 255 characters.
server_id	char	A unique name identifying the server where the database resides. Maximum length of string it points to is 8 characters.
db2instance	char	The db2instance ID. This is the user ID invoking the command. Maximum length of string it points to is 8 characters.

type	char	Specifies the type of backup being taken or the type of restore being performed. The following are possible values:
		
		When action is SQLUV_WRITE:
		`0 - full database backup`
		`3 - table space level backup`
		
		When action is SQLUV_READ:
		`0 - full restore`
		`3 - online table space restore`
		`4 - table space restore`
		`5 - history file restore`

dbname	char	The name of the database to be backed up or restored. Maximum length of string it points to is 8 characters.

Table 88. Fields in the DB2-INFO Structure (continued)

Field Name	Data Type	Description
alias	char	The alias of the database to be backed up or restored. Maximum length of string it points to is 8 characters.
timestamp	char	The time stamp used to identify the backup image. Maximum length of string it points to is 26 characters.
sequence	char	Specifies the file extension for the backup image. For write operations, the value for the first session is 1 and each time another session is initiated with an sqluvint call, the value is incremented by 1. For read operations, the value is always zero. Maximum length of string it points to is 3 characters.
obj_list	struct sqlu_gen_list	Lists the objects in the backup image. This is provided to the vendors for their information only.
max_bytes_per_txn	sqlint32	Specifies to the vendor in bytes, the transfer buffer size specified by the user.
image_filename	char	Reserved for future use.
reserve	void	Reserved for future use.
nodename	char	Name of the node at which the backup was generated.
password	char	Password for the node at which the backup was generated.
owner	char	ID of the backup originator.
mcNameP	char	Management class.
nodeNum	SQL_PDB_NODE_TYPE	Node number. Numbers greater than 255 are supported by the vendor interface.

The *filename,* or *server_id, db2instance, type, dbname* and *timestamp* uniquely identifies the backup image. The sequence number specified by *seq* identifies the file extension. When a backup image is to be restored, the same values must be used to retrieve the backup image. Depending on the vendor product, if *filename* is used, the other parameters may be set to NULL, and vice versa.

Language Syntax

C Structure

```
/* File: sqluvend.h */
/* ... */
typedef struct DB2_info
{
  char                  *DB2_id;
  char                  *version;
  char                  *release;
  char                  *level;
  char                  *action;
  char                  *filename;
  char                  *server_id;
  char                  *db2instance;
  char                  *type;
  char                  *dbname;
  char                  *alias;
  char                  *timestamp;
  char                  *sequence;
  struct sqlu_gen_list  *obj_list;
  long                  max_bytes_per_txn;
  char                  *image_filename;
  void                  *reserve;
  char                  *nodename;
  char                  *password;
  char                  *owner;
  char                  *mcNameP;
  SQL_PDB_NODE_TYPE     nodeNum;
} DB2_info;
/* ... */
```

VENDOR-INFO

This structure contains information to identify the vendor and the version of the device being used.

Note: All fields are NULL terminated strings.

Table 89. Fields in the VENDOR-INFO Structure

Field Name	Data Type	Description
vendor_id	char	An identifier for the vendor. Maximum length of string it points to is 64 characters.
version	char	The current version of the vendor product. Maximum length of string it points to is 8 characters.
release	char	The current release of the vendor product. Set to NULL if it is insignificant. Maximum length of string it points to is 8 characters.
level	char	The current level of the vendor product. Set to NULL if it is insignificant. Maximum length of string it points to is 8 characters.
server_id	char	A unique name identifying the server where the database resides. Maximum length of string it points to is 8 characters.
max_bytes_per_txn	sqlint32	The maximum supported transfer buffer size. Specified by the vendor in bytes. This is used only if the return code from the vendor initialize function is SQLUV_BUFF_SIZE, indicating an invalid buffer size is specified.
num_objects_in_backup	sqlint32	The number of sessions that were used to make a complete backup. This is used to determine when all backup images have been processed during a restore.
reserve	void	Reserved for future use.

Language Syntax

C Structure

```
typedef struct Vendor_info
{
  char       *vendor_id;
  char       *version;
  char       *release;
  char       *level;
  char       *server_id;
  sqlint32   max_bytes_per_txn;
  sqlint32   num_objects_in_backup;
  void       *reserve;
} Vendor_info;
```

INIT-INPUT

This structure contains information provided by DB2 to set up and to establish a logical link with the vendor device.

Note: All fields are NULL terminated strings.

Table 90. Fields in the INIT-INPUT Structure

Field Name	Data Type	Description
DB2_session	struct DB2_info	A description of the session from the DB2 perspective.
size_options	unsigned short	The length for the options field. When using sqlubkp and sqlurestore, the data in this field is passed directly from the *VendorOptionsSize* parameter.
size_HI_order	sqluint32	High order 32 bits of DB size estimate in bytes; total size is 64 bits.
size_LOW_order	sqluint32	Low order 32 bits of DB size estimate in bytes; total size is 64 bits.
options	void	This information is passed from the application when the backup or restore function is invoked. This data structure must be flat. In other words, no level of indirection is supported. Note that byte-reversal is not done, and that code page is not checked for this data. When using sqlubkp and sqlurestore, the data in this field is passed directly from the *pVendorOptions* parameter.
reserve	void	Reserved for future use.
prompt_lvl	char	Prompting level requested by the user when backup or restore was invoked. Maximum length of string it points to is 1 character.
num_sessions	unsigned short	Number of sessions requested by the user when backup or restore was invoked.

Language Syntax

C Structure

```
typedef struct Init_input
{
  struct DB2_info  *DB2_session;
  unsigned short   size_options;
  sqluint32        size_HI_order;
  sqluint32        size_LOW_order;
  void             *options;
  void             *reserve;
  char             *prompt_lvl;
  unsigned short   num_sessions;
} Init_input;
```

INIT-OUTPUT

This structure contains the output returned by the vendor device.

Table 91. Fields in the INIT-OUTPUT Structure

Field Name	Data Type	Description
vendor_session	struct Vendor_info	Contains information to identify the vendor to DB2.
pVendorCB	void	Vendor control block.
reserve	void	Reserved for future use.

Language Syntax

C Structure

```
typedef struct Init_output
{
  struct Vendor_info  *vendor_session;
  void                *pVendorCB;
  void                *reserve;
} Init_output;
```

DATA

This structure contains data transferred (read and write) between DB2 and the vendor device.

Table 92. Fields in the DATA Structure

Field Name	Data Type	Description
obj_num	sqlint32	The sequence number assigned by DB2 during backup.
buff_size	sqlint32	The size of the buffer.
actual_buf_size	sqlint32	The actual number of bytes sent or received. This must not exceed *buff_size*.
dataptr	void	Pointer to the data buffer. DB2 allocates space for the buffer.
reserve	void	Reserved for future use.

Language Syntax

C Structure

```
typedef struct Data
{
  sqlint32  obj_num;
  sqlint32  buff_size;
  sqlint32  actual_buff_size;
  void      *dataptr;
  void      *reserve;
} Data;
```

RETURN-CODE

This structure contains the return code and a short text explanation of the error to be returned to DB2.

Table 93. Fields in the RETURN-CODE Structure

Field Name	Data Type	Description
return_code[a]	sqlint32	Return code from the vendor function.
description	char	A short text description of the return code.
reserve	void	Reserved for future use.
Note: [a]This is a vendor-specific return code, and is not identical to the one used as the return value for various APIs.		

Language Syntax

C Structure

```
typedef struct Return_code
{
  sqlint32  return_code,
  char      description[60],
  void      *reserve,
} Return_code;
```

See the individual API descriptions for valid return codes accepted from vendor products.

Invoking Backup/Restore Using Vendor Products

Parameters are available to specify the use of vendor products for backup and restore through these interfaces:

- Control Center backup and restore tools
- Command Line Processor (CLP) BACKUP and RESTORE commands
- Backup and Restore API function calls.

The Control Center

The Control Center is the GUI interface for database administration shipped with DB2. Information on invoking the Control Center is contained in the *Command Reference*.

Its use is documented through help panels provided with the interface. These should be reviewed to gain an understanding of the backup and restore tools that are part of the Control Center.

The following parameters are used to specify the use of vendor device support:

To Specify	Control Center Input Variables (for both Backup and Restore)
Use of vendor device and library name	Select *Use Library,* and specify the library name (on UNIX based systems) or the DLL name (on OS/2 or the Windows operating system).
Number of sessions	*Sessions*
Vendor options	not supported
Vendor file name	not supported
Transfer buffer size	For backup: *Size of each Buffer* For restore: not applicable.

The Command Line Processor

The command line processor (CLP) is the non-GUI tool shipped with DB2 that can be utilized for database administration and other tasks. The BACKUP DATABASE and RESTORE DATABASE CLP commands are documented in the *Command Reference*.

The specification of vendor device support is handled by the following parameters:

To Specify	Command Line Processor Parameter	
	for Backup	for Restore
Use of vendor device and library name	library-name	shared-library
Number of sessions	num-sessions	num-sessions
Vendor options	not supported	not supported
Vendor file name	not supported	not supported
Transfer buffer size	buffer-size	buffer-size

Backup and Restore API Function Calls

Two API function calls are provided to support backup and restore: **sqlubkp** for backup (see "sqlubkp - Backup Database" on page 290), and **sqlurestore** for restore (see "sqlurestore - Restore Database" on page 381).

A number of parameters on these API calls support the invocation and passing of data to the vendor device support functions:

To Specify	API Parameter (for both sqlubkp and sqlurst)
Use of vendor device and library name	In structure sqlu_media_list, specify a media-type of SQLU_OTHER_MEDIA, and then in structure sqlu_vendor, specify the shared library or DLL in shr_lib.
Number of sessions	In structure sqlu_media_list, specify sessions.
Vendor options	PVendorOptions
Vendor file name	In structure sqlu_media_list, specify a media-type of SQLU_OTHER_MEDIA, and then in structure sqlu_vendor, specify the file name using filename.
Transfer buffer size	BufferSize

Appendix E. Threaded Applications with Concurrent Access

In the default implementation of threaded applications against a DB2 database, serialization of access to the database is enforced by the database APIs. If one thread performs a database call that is blocked for some reason (that is, the table is already in exclusive use), all other threads will be blocked as well. In addition, all threads within a process share a commit scope. True concurrent access to a database can only be achieved through separate processes, or by using the APIs that are described in this section.

This section describes APIs that can be used to allocate and manipulate separate environments (contexts) for the use of database APIs and embedded SQL. Each context is a separate entity, and any connection or attachment using one context is independent of all other contexts (and thus all other connections or attachments within a process). In order for work to be done on a context, it must first be associated with a thread. A thread must always have a context when making database API calls or when using embedded SQL. If these APIs to manipulate contexts are not used, all threads within a process share the same context. If these APIs are used, each thread can have its own context. It will have a separate connection to a database or attachment to an instance, and will have its own commit scope.

Contexts need not be associated with a given thread for the duration of a connection or attachment. One thread can attach to a context, connect to a database, detach from the context, and then a second thread can attach to the context and continue doing work using the already existing database connection. Contexts can be passed around among threads in a process, but not among processes.

If the new APIs are not used, the old behavior is in effect, and existing applications need not change.

Even if the new APIs are used, the following APIs continue to be serialized:

- sqlabndx - Bind
- sqlaprep - Precompile Program
- sqluexpr - Export
- sqluimpr - Import.

The new APIs can be used with embedded SQL and the transaction APIs.

These APIs have no effect (that is, they are no-ops) on platforms that do not support application threading.

Notes:

1. CLI automatically uses the new scheme (it creates a new context for each incoming connection), and it is up to the user to disable this explicitly. For more information, see the *CLI Guide and Reference*.
2. By default, AIX does not permit more than 10 share memory segments per process, thus limiting the number of local DB2 connections per process to 10. When this limit is reached, DB2 returns SQLCODE -1224 on an SQL CONNECT. DB2 Connect also has the 10-connections limitation if local users are running two-phase commit over SNA, or two-phase commit with a TP Monitor (SNA or TCP/IP).

   On AIX Version 4.2.1 or greater, the environment variable **EXTSHM** (`=ON`) can be used to enhance the number of shared memory regions to which a process can attach.

   On AIX prior to Version 4.2.1, there are no operating system-based solutions. An alternative is to move the local database or DB2 Connect into another machine and to access it remotely, or to access the local database or the DB2 Connect database with TCP/IP loop-back by cataloging it as a remote node that has the TCP/IP address of the local machine.

sqleAttachToCtx - Attach to Context

Makes the current thread use a specified context. All subsequent database calls made on this thread will use this context. If more than one thread is attached to a given context, access is serialized for these threads, and they share a commit scope.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleAttachToCtx (
void           *pCtx,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

pCtx Input. A valid context previously allocated by "sqleBeginCtx - Create and Attach to an Application Context" on page 594.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqleBeginCtx - Create and Attach to an Application Context

Creates an application context, or creates and then attaches to an application context. More than one application context can be created. Each context has its own commit scope. Different threads can attach to different contexts (see "sqleAttachToCtx - Attach to Context" on page 593). Any database API calls made by such threads will not be serialized with one another.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleBeginCtx (
void           **ppCtx,
sqlint32       lOptions,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

ppCtx Output. A data area allocated out of private memory for the storage of context information.

lOptions
Input. Valid values are:

SQL_CTX_CREATE_ONLY
The context memory will be allocated, but there will be no attachment.

SQL_CTX_BEGIN_ALL
The context memory will be allocated, and then a call to "sqleAttachToCtx - Attach to Context" on page 593 will be made for the current thread. If this option is used, the *ppCtx* parameter can be NULL. If the thread is already attached to a context, the call will fail.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca

Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqleDetachFromCtx - Detach From Context

Detaches the context being used by the current thread. The context will be detached only if an attach to that context has previously been made.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleDetachFromCtx (
void           *pCtx,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

pCtx Input. A valid context previously allocated by "sqleBeginCtx - Create and Attach to an Application Context" on page 594.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqleEndCtx - Detach and Destroy Application Context

Frees all memory associated with a given context.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleEndCtx (
void           **ppCtx,
sqlint32       lOptions,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

ppCtx Output. A data area in private memory (used for the storage of context information) that is freed.

lOptions
Input. Valid values are:

SQL_CTX_FREE_ONLY
The context memory will be freed only if a prior detach has been done.

Note: *pCtx* must be a valid context previously allocated by "sqleBeginCtx - Create and Attach to an Application Context" on page 594.

SQL_CTX_END_ALL
If necessary, a call to "sqleDetachFromCtx - Detach From Context" on page 596 will be made before the memory is freed.

Note: A detach will be done even if the context is still in use. If this option is used, the *ppCtx* parameter can be NULL, but if passed, it must be a valid context previously allocated by "sqleBeginCtx - Create and Attach to an Application Context" on page 594. A call to

"sqleGetCurrentCtx - Get Current Context" on page 599 will be made, and the current context freed from there.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

If a database connection exists, or the context has been attached by another thread, this call will fail.

Note: If a context calls an API that establishes an instance attachment (for example, "sqlfxdb - Get Database Configuration" on page 275), it is necessary to detach from the instance using "sqledtin - Detach" on page 193 before calling **sqleEndCtx**.

sqleGetCurrentCtx - Get Current Context

Returns the current context associated with a thread.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleGetCurrentCtx (
void           **ppCtx,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

ppCtx Output. A data area allocated out of private memory for the storage of context information.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

sqleInterruptCtx - Interrupt Context

Interrupts the specified context.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

Database

API Include File

sql.h

C API Syntax

```
int sqleInterruptCtx (
void           *pCtx,
void           *reserved,
struct sqlca   *pstSqlca);
```

API Parameters

pCtx Input. A valid context previously allocated by "sqleBeginCtx - Create and Attach to an Application Context" on page 594.

reserved
Reserved for future use. Must be set to NULL.

pstSqlca
Output. A pointer to the *sqlca* structure. For more information about this structure, see "SQLCA" on page 450.

Usage Notes

During processing, this API:

- Switches to the context that has been passed in
- Sends an interrupt
- Switches to the original context
- Exits.

sqleSetTypeCtx - Set Application Context Type

Sets the application context type. This API should be the first database API called inside an application.

Scope

The scope of this API is limited to the immediate process.

Authorization

None

Required Connection

None

API Include File

sql.h

C API Syntax

```
int sqleSetTypeCtx (
sqlint32   lOptions);
```

API Parameters

lOptions

Input. Valid values are:

SQL_CTX_ORIGINAL

All threads will use the same context, and concurrent access will be blocked. This is the default if none of these APIs is called.

SQL_CTX_MULTI_MANUAL

All threads will use separate contexts, and it is up to the application to manage the context for each thread. See

- "sqleBeginCtx - Create and Attach to an Application Context" on page 594
- "sqleAttachToCtx - Attach to Context" on page 593
- "sqleDetachFromCtx - Detach From Context" on page 596
- "sqleEndCtx - Detach and Destroy Application Context" on page 597.

The following restrictions/changes apply when this option is used:

- When termination is normal, automatic COMMIT at process termination is disabled. All outstanding transactions are rolled back, and all COMMITs must be done explicitly.

- "sqleintr - Interrupt" on page 217 interrupts all contexts. To interrupt a specific context, use "sqleInterruptCtx - Interrupt Context" on page 600.

Usage Notes

This API must be called *before* any other database call, and only the first call is effective.

Appendix F. DB2 Common Server Log Records

This section describes the structure of the DB2 common server log records returned by "sqlurlog - Asynchronous Read Log" on page 394.

All DB2 common server log records begin with a log manager header. This header includes the total log record size, the log record type, and transaction-specific information. It does not include information about accounting, statistics, traces, or performance evaluation. For more information, see "Log Manager Header" on page 605.

Log records are uniquely identified by a log sequence number (LSN). The LSN represents a relative byte address, within the database log, for the first byte of the log record. It marks the offset of the log record from the beginning of the database log.

The log records written by a single transaction are uniquely identifiable by a field in the log record header. The unique transaction identifier is a six-byte field that increments by one whenever a new transaction is started. All log records written by a single transaction contain the same identifier.

When a transaction performs writable work against a table with DATA CAPTURE CHANGES on, or invokes a log writing utility, the transaction is marked as propagatable. Only propagatable transactions have their transaction manager log records marked as propagatable.

Table 94. DB2 Common Server Log Records

Data Manager	
"Initialize Table" on page 609	New permanent table creation.
"Import Replace (Truncate)" on page 612	Import replace activity.
"Rollback Insert" on page 612	Rollback row insert.
"Reorg Table" on page 612	REORG committed.
"Create Index, Drop Index" on page 613	Index activity.
"Create Table, Drop Table, Rollback Create Table, Rollback Drop Table" on page 613	Table activity.
"Alter Table Attribute" on page 613	Propagation, check pending, and append mode activity.
"Alter Table Add Columns, Rollback Add Columns" on page 614	Adding columns to existing tables.

Table 94. DB2 Common Server Log Records (continued)

"Insert Record, Delete Record, Rollback Delete Record, Rollback Update Record" on page 615	Table record activity.
"Update Record" on page 619	Row updates where storage location not changed.
Long Field Manager	
"Add/Delete/Non-update Long Field Record" on page 620	Long field record activity.
LOB Manager	
"Insert LOB Data Log Record (AFIM_DATA)" on page 622	Adding LOB data with logging.
"Insert LOB Data Log Record (AFIM_AMOUNT)" on page 622	Adding LOB data without logging.
Transaction Manager	
"Normal Commit" on page 623	Transaction commits.
"Heuristic Commit" on page 623	Indoubt transaction commits.
"MPP Coordinator Commit" on page 623	Transaction commits. This is written on a coordinator node for an application that performs updates on at least one subordinator node.
"MPP Subordinator Commit" on page 624	Transaction commits. This is written on a subordinator node.
"Normal Abort" on page 624	Transaction aborts.
"Heuristic Abort" on page 625	Indoubt transaction aborts.
"Local Pending List" on page 625	Transaction commits with a pending list existing.
"Global Pending List" on page 625	Transaction commits (two-phase) with a pending list existing.
"XA Prepare" on page 626	XA transaction preparation in two-phase commit environments.
"MPP Subordinator Prepare" on page 627	MPP transaction preparation in two-phase commit environments. This log record only exists on subordinator nodes.
"Backout Free" on page 627	Marks the end of a backout free interval. The backout free interval is a set of log records that is not to be compensated if the transaction aborts.
Utility Manager	
"Migration Begin" on page 628	Catalog migration starts.

Table 94. DB2 Common Server Log Records (continued)

"Migration End" on page 628	Catalog migration completes.
"Load Start" on page 628	Table load starts.
"Table Load Delete Start" on page 629	Load delete phase starts.
"Load Delete Start Compensation" on page 629	Load delete phase ends.
"Load Pending List" on page 629	Table load completes.
"Backup End" on page 630	Backup activity completes.
"Tablespace Rolled Forward" on page 630	Table space rollforward completes.
"Tablespace Roll Forward to PIT Begins" on page 630	Marks the beginning of a table space rollforward to a point in time.
"Tablespace Roll Forward to PIT Ends" on page 630	Marks the end of a table space rollforward to a point in time.
Datalink Manager	
"Link File" on page 631	Written when an insert or an update on a table with a DATALINK column creates a link to a file.
"Unlink File" on page 632	Written when a delete or an update on a table with a DATALINK column drops a link to a file.
"Delete Group" on page 633	Written when a table with DATALINK columns (having the file link control attribute) is dropped.
"Delete PGroup" on page 633	Written when a table space is dropped.
"DLFM Prepare" on page 634	Written during the prepare phase, when a two-phase commit is used for transactions involving DB2 Data Links Managers.

Log Manager Header

All DB2 common server log records begin with a log manager header. This header contains information detailing the log record and transaction information of the log record writer.

Table 95. Log Manager Log Record Header (LogManagerLogRecordHeader)

Description	Type	Offset (Bytes)
Length of the entire log record	int	0(4)
Type of log record[a]	short	4(2)
Log record general flag[b]	short	6(2)

Table 95. Log Manager Log Record Header (LogManagerLogRecordHeader) (continued)

Description	Type	Offset (Bytes)
Log Sequence Number of the previous log record written by this transaction. It is used to chain log records by transaction. If the value is 0000 0000 0000, this is the first log record written by the transaction.	SQLU_LSN[c]	8(6)
Unique transaction identifier	SQLU_TID[d]	14(6)
Log Sequence Number of the log record for this transaction prior to the log record being compensated. (Note: For compensation and backout free log records only.)	SQLU_LSN	20(6)
Log Sequence Number of the log record for this transaction being compensated. (Note: For propagatable compensation log records only.)	SQLU_LSN	26(6)
Total Length for Log Manager Log Record Header: • *Non Compensation: 20 bytes* • *Compensation: 26 bytes* • *Propagatable Compensation: 32 bytes*		

Table 95. Log Manager Log Record Header (LogManagerLogRecordHeader) (continued)

Description	Type	Offset (Bytes)
Definitions and Values		

[a] Valid log record types

```
a  Datalink manager log record     o  Backup start
A  Normal abort                    O  Backup end
B  Backout free                    p  Tablespace roll forward to PIT starts
c  MPP coordinator commit          P  Table quiesce
C  Compensation                    q  Tablespace roll forward to PIT ends
D  Tablespace rolled forward       Q  Global pending list
E  Local pending list              R  Redo
F  Forget transaction              s  MPP subordinate commit
g  MPP log synchronization         S  Compensation required
G  Load pending list               T  Partial abort
H  Table load delete start         U  Undo
i  Propagate only                  V  Migration begin
I  Heuristic abort                 W  Migration end
J  Load start                      X  TM prepare
K  Load delete start compensation  Y  Heuristic commit
L  Lock description                z  MPP prepare
M  Normal commit                   Z  XA prepare
N  Normal

Note:  A log record of type 'i' is an informational log record only.
       It will be ignored by DB2 during roll forward, roll back,
       and crash recovery.
```

[b] Log record general flag constants

```
Redo Always                0x0001
Propagatable               0x0002
Conditionally Recoverable  0x0080
```

[c] Log Sequence Number (LSN)

```
A unique log record identifier representing the relative byte address
of the log record within the database log.

SQLU_LSN: union {  char  [6] ;
                   short [3] ;
                 }
```

[d] Transaction Identifier (TID)

```
A unique log record identifier representing the transaction.

SQLU_TID: union {  char  [6] ;
                   short [3] ;
                 }
```

Data Manager Log Records

Data manager log records are the result of DDL, DML, or Utility activities.

There are two types of data manager log records:

- Data Management System (DMS) logs have a component identifier of 1 in their header.
- Data Object Manager (DOM) logs have a component identifier of 4 in their header.

Table 96. DMS Log Record Header Structure (DMSLogRecordHeader)

Description	Type	Offset (Bytes)
Component identifier (=1)	unsigned char	0(1)
Function identifier[a]	unsigned char	1(1)
Table identifiers	unsigned short	2(2)
Table space identifier	unsigned short	4(2)
Table identifier		
Total Length: 6 bytes		
Values and Definitions [a] Valid function identifier values 102 Add columns to table 104 Undo add columns 106 Delete record 110 Undo insert record record 111 Undo delete record 112 Undo update record 113 Alter column length 115 Undo alter column length 118 Insert record 120 Update record 124 Alter table attribute 128 Initialize table		

Table 97. DOM Log Record Header Structure (DOMLogRecordHeader)

Description	Type	Offset (Bytes)
Component identifier (=4)	unsigned char	0(1)
Function identifier[a]	unsigned char	1(1)
Object identifiers	unsigned short	2(2)
Table space identifier	unsigned short	4(2)
Object identifier		

Table 97. DOM Log Record Header Structure (DOMLogRecordHeader) (continued)

Description	Type	Offset (Bytes)
Table identifiers Table space identifier Table identifier	unsigned short unsigned short	6(2) 8(2)
Object type	unsigned char	10(1)
Flags	unsigned char	11(1)
Total Length: 12 bytes		
Values and Definitions [a] Valid function identifier values 2 Create index 3 Drop index 4 Drop table 11 Truncate table (import replace) 35 Reorg table 101 Create table 130 Undo create table		

Note: All data manager log record offsets are from the end of the log manager record header.

All log records whose function identifier short name begins with `UNDO` are log records written during the UNDO or ROLLBACK of the action in question.

The ROLLBACK can be a result of:

- The user issuing the ROLLBACK transaction statement
- A deadlock causing the ROLLBACK of a selected transaction
- The ROLLBACK of uncommitted transactions following a crash recovery
- The ROLLBACK of uncommitted transactions following a RESTORE and ROLLFORWARD of the logs.

Initialize Table

The initialize table log record is written when a new permanent table is being created; it signifies table initialization. This record appears after any log records that create the DATA storage object, and before any log records that create the LF and LOB storage objects. This is a Redo log record.

Table 98. Initialize Table Log Record Structure

Description	Type	Offset (Bytes)
Log header	DMSLogRecordHeader	0(6)

Table 98. Initialize Table Log Record Structure (continued)

Description	Type	Offset (Bytes)
File create LSN	SQLU_LSN	6(6)
Table directory record	variable	12(72)
record type	unsigned char	12(1)
reserved	char	13(1)
index flag	unsigned short	14(2)
index root page	sqluint32	16(4)
TDESC recid	sqlint32	20(4)
reserved	char	24(56)
flags[a]	sqluint32	80(4)
Table description length		84(4)
Table description record	variable	88(variable)
record type	unsigned char	88(1)
reserved	char	89(1)
number of columns	unsigned short	90(2)
array	variable long	92(variable)
Total Length: 88 bytes plus table description record length		

[a] Bit 0x00000020 indicates that the table was created with the NOT LOGGED INITIALLY option, and that no DML activity on this table is logged until the transaction that created the table has been committed.

Table 98. Initialize Table Log Record Structure (continued)

Description	Type	Offset (Bytes)
Table Description Record: column descriptor array (number of columns) * 8, where each element of the array contains: • field type (unsigned short, 2 bytes) SMALLINT 0x0000 CHAR 0x0100 GRAPHIC 0x0200 INTEGER 0x0001 VARCHAR 0x0101 VARGRAPH 0x0201 DECIMAL 0x0002 LONG VARCHAR 0x0104 LONG VARG 0x0202 DOUBLE 0x0003 DATE 0x0105 DBCLOB 0x0203 REAL 0x0004 TIME 0x0106 BIGINT 0x0005 TIMESTAMP 0x0107 BLOB 0x0108 CLOB 0x0109 DATALINK 0x010E • length (2 bytes) – If BLOB, CLOB, or DBCLOB, this field is not used. For the maximum length of this field, see the array that follows the column descriptor array. – If not DECIMAL, length is the maximum length of the field (short). – If PACKED DECIMAL: Byte 1, unsigned char, precision (total length) Byte 2, unsigned char, scale (fraction digits). • null flag (unsigned short, 2 bytes) – mutually exclusive: allows nulls, or does not allow nulls – valid options: no default, type default, or user default ISNULL 0x01 NONULLS 0x02 TYPE_DEFAULT 0x04 USER_DEFAULT 0x08 • field offset (unsigned short, 2 bytes) This is the offset from the start of the formatted record to where the field's fixed value can be found.		
Table Description Record: LOB descriptor array (number of LOB, CLOB, and DBCLOB fields) * 12, where each element of the array contains: • length (MAX LENGTH OF FIELD, sqluint32, 4 bytes) • reserved (internal, sqluint32, 4 bytes) • log flag (IS COLUMN LOGGED, sqluint32. 4 bytes) The first LOB, CLOB, or DBCLOB encountered in the column descriptor array uses the first element in the LOB descriptor array. The second LOB, CLOB, or DBCLOB encountered in the column descriptor array uses the second element in the LOB descriptor array, and so on.		

Import Replace (Truncate)

The import replace (truncate) log record is written when an IMPORT REPLACE action is being executed. This record indicates the re-initialization of the table (no user records, new life LSN). The second set of pool and object IDs in the log header identify the table being truncated (IMPORT REPLACE). This is a Redo log record.

Table 99. Import Replace (Truncate) Log Record Structure

Description	Type	Offset (Bytes)
Log header	DOMLogRecordHeader	0(12)
internal	variable	12(variable)
Total Length: 12 bytes plus variable length		

Rollback Insert

The rollback insert log record is written when an insert row action (INSERT RECORD) is rolled back. This is a Compensation log record.

Table 100. Rollback Insert Log Record Structure

Description	Type	Offset (Bytes)
Log header	DMSLogRecordHeader	0(6)
Padding	char[ ]	6(2)
RID	sqlint32	8(4)
Record length	unsigned short	12(2)
Free space	unsigned short	14(2)
Total Length: 16 bytes		

Reorg Table

The reorg table log record is written when the REORG utility has committed to completing the reorganization of a table. This is a Normal log record.

Table 101. Reorg Table Log Record Structure

Description	Type	Offset (Bytes)
Log header	DOMLogRecordHeader	0(12)
Internal	variable	12(252)
Index token[a]	unsigned short	2(264)
Temporary tablespace ID[b]	unsigned short	2(266)
Total Length: 268 bytes		
[a] If not 0, it is the index by which the reorg is clustered (clustering index). [b] If not 0, it is the system temporary table space that was used to build the reorg.		

Create Index, Drop Index

These log records are written when indexes are created or dropped. The two elements of the log record are:

- The index root page, which is an internal identifier
- The index token, which is equivalent to the `IID` column in SYSIBM.SYSINDEXES. If the value for this element is 0, the log record represents an action on an internal index, and is not related to any user index.

This is a Undo log record.

Table 102. Create Index, Drop Index Log Records Structure

Description	Type	Offset (Bytes)
Log header	DOMLogRecordHeader	0(12)
Padding	char[ ]	12(2)
Index token	unsigned short	14(2)
Index root page	sqluint32	16(4)
Total Length: 20 bytes		

Create Table, Drop Table, Rollback Create Table, Rollback Drop Table

These log records are written when the DATA object for a permanent table is created or dropped. The DATA object is created during a CREATE TABLE, and prior to table initialization (Initialize Table). Create table and drop table are Normal log records. Rollback create table and rollback drop table are Compensation log records.

Table 103. Create Table, Drop Table, Rollback Create Table, Rollback Drop Table Log Records Structure

Description	Type	Offset (Bytes)
Log header	DOMLogRecordHeader	0(12)
Internal	variable	12(56)
Total Length: 68 bytes		

Alter Table Attribute

The alter table attribute log record is written when the state of a table is changed VIA the ALTER TABLE statement or as a result of adding or validating constraints.

Table 104. Alter Table Attribute, Undo Alter Table Attribute

Description	Type	Offset (Bytes)
Log header	DMSLogRecordHeader	0(6)
Padding	char[ ]	6(2)
Alter bit (attribute) mask	int	8(4)
Alter bit (attribute) values	int	12(4)
Total Length: 16 bytes		

Attribute Bits:

```
0x00000001   Propagation
0x00000002   Check Pending
0x00010000   Append Mode
0x00200000   LF Propagation
0x00400000   LOB Propagation
```

If one of the bits above is present in the alter bit mask, then this attribute of the table is being altered. To determine the new value of the table attribute (0 = OFF and 1 = ON), check the corresponding bit in the alter bit value.

Alter Table Add Columns, Rollback Add Columns

The alter table add columns log record is written when the user is adding columns to an existing table using an ALTER TABLE statement. Complete information on the old columns and new columns is logged.

- Column count elements represent the old number of columns and the new total number of columns.
- The parallel arrays contain information about the columns defined in the table. The old parallel array defines the table prior to the ALTER TABLE statement, while the new parallel array defines the table resulting from ALTER TABLE statement.
- Each parallel array consists of:
  - An array equivalent to the column descriptor array in the table description record (see "Initialize Table" on page 609).
  - A second array equivalent to the LOB descriptor array in the table description record. However, since this array is parallel to the first, the only elements used are those whose corresponding element in the first array are of type BLOB, CLOB, or DBCLOB.

Alter table add columns is a Normal log record. Rollback add columns is a Compensation log record.

Table 105. Alter Table Add Columns, Rollback Add Columns Log Records Structure

Description	Type	Offset (Bytes)
Log header	DMSLogRecordheader	0(6)

Table 105. Alter Table Add Columns, Rollback Add Columns Log Records Structure (continued)

Description	Type	Offset (Bytes)
Padding	char[ ]	6(2)
Old column count	int	8(4)
New column count	int	12(4)
Old parallel arrays[a]	variable	16(variable)
New parallel arrays[b]	variable	variable
*Total Length: 40 bytes plus 2 sets of parallel arrays; array size is (old/new column count) * 20.*		
Array Elements <\p> [a] Each element in this array is 8 bytes long. [b] Each element in this array is 12 bytes long. For information about the column descriptor array or the LOB descriptor array, see Table 98 on page 609).		

Insert Record, Delete Record, Rollback Delete Record, Rollback Update Record

These log records are written when rows are inserted into or deleted from a table. Insert record and delete record log records are generated during an update if the location of the record being updated must be changed to accommodate the modified record data. Insert record and delete record are Normal log records. Rollback delete record and rollback update record are Compensation log records.

Table 106. Insert Record, Delete Record, Rollback Delete Record, Rollback Update Record Log Records Structure

Description	Type	Offset (Bytes)
Log header	DMSLogRecordHeader	0(6)
Padding	char[ ]	6(2)
RID	sqlint32	8(4)
Record length	unsigned short	12(2)
Free space	unsigned short	14(2)
Record offset	unsigned short	16(2)
Record header and data	variable	18(variable)
Total Length: 18 bytes plus Record length		

Table 106. Insert Record, Delete Record, Rollback Delete Record, Rollback Update Record Log Records Structure (continued)

Description	Type	Offset (Bytes)
Record Header and Data Details: **Record header** 4 bytes • Record type[a] (unsigned char, 1 byte). Records are one of two classes: – Updatable – Special control A value of 0 or 4 indicates that the record can be viewed. Each class has three types: – Normal – Pointer – Overflow • Reserved (char, 1 byte) • Record length (unsigned short, 2 bytes) **Record** variable • Record type (unsigned char, 1 byte). Updatable records are one of two types: – Internal control – Formatted user data A value of 1 signifies a formatted user data record. • Reserved (char, 1 byte) • The rest of the record is dependent upon the record type and the table descriptor record defined for the table. If the record type is internal control, the data cannot be viewed. The following fields apply to user data records: – Fixed length (unsigned short, 2 bytes). This is the length of all fixed portions of the data row. – Formatted record (fixed and variable length). For more information about formatted records, see "Formatted User Data Record". [a] Record data can only be viewed if the record type (specified in the record header) is updatable (that is, *not* special control).		

Formatted User Data Record

The formatted record can be a combination of fixed and variable length data. All fields contain a fixed length portion. In addition, there are eight field types that have variable length parts:

- VARCHAR
- LONG VARCHAR
- DATALINK
- BLOB
- CLOB
- VARGRAPHIC
- LONG VARG
- DBCLOB

Field Lengths

The length of the fixed portion of the different field types can be determined as follows:

- DECIMAL

  This field is a standard packed decimal in the form: *nnnnnn...s*. The length of the field is: (precision + 2)/2. The sign nibble (s) is xC for positive (+), and xD or xB for negative (–).
- SMALLINT INTEGER BIGINT DOUBLE REAL CHAR GRAPHIC

  The length field in the element for this column in the table descriptor record contains the fixed length size of the field.
- DATE

  This field is a 4-byte packed decimal in the form: *yyyymmdd*. For example, April 3, 1996 is represented as x'19960403'.
- TIME

  This field is a 3-byte packed decimal in the form: *hhmmss*. For example, 1:32PM is represented as x'133200'.
- TIMESTAMP

  This field is a 10-byte packed decimal in the form: *yyyymmddhhmmssuuuuuu* (DATE | TIME | microseconds).
- VARCHAR LONG VARCHAR DATALINK BLOB CLOB VARGRAPHIC LONG VARG DBCLOB

  The length of the fixed portion of all the variable length fields is 4.

Note: For element addresses, see Table 98 on page 609.

For more detailed information about field types, see the *SQL Reference*.

The following sections describe the location of the fixed portion of each field within the formatted record.

Table Descriptor Record

The table descriptor record describes the column format of the table. It contains an array of column structures, whose elements represent field type, field length, null flag, and field offset. The latter is the offset from the beginning of the formatted record, where the fixed length portion of the field is located.

Table 107. Table Descriptor Record Structure

Table Descriptor Record			
record type	number of columns	column structure • field type • length • null flag • field offset	LOB information
Note: For more information, see Table 98 on page 609.			

For columns that are nullable (as specified by the null flag), there is an additional byte following the fixed length portion of the field. This byte contains one of two values:

- NOT NULL (0x00)
- NULL (0x01)

If the null flag within the formatted record for a column that is nullable is set to 0x00, there is a valid value in the fixed length data portion of the record. If the null flag value is 0x01, the data field value is NULL.

The formatted user data record contains the table data that is visible to the user. It is formatted as a fixed length record, followed by a variable length section.

Table 108. Formatted User Data Record Structure

Formatted User Data Record			
record type	length of fixed section	fixed length section	variable data section
Note: For more information, see Table 106 on page 615.			

All variable field types have a 4-byte fixed data portion in the fixed length section (plus a null flag, if the column is nullable). The first 2 bytes (short) represent the offset from the beginning of the fixed length section, where the

variable data is located. The next 2 bytes (short) specify the length of the variable data referenced by the offset value.

Update Record

The update record log record is written when a row is updated, and if its storage location does not change. There are two available log record formats; they are identical to the insert record and the delete record log records (see "Insert Record, Delete Record, Rollback Delete Record, Rollback Update Record" on page 615). One contains the *pre*-update image of the row being updated; the other contains the *post*-update image of the row being updated. This is a Normal log record.

Table 109. Update Record Log Record Structure

Description	Type	Offset (Bytes)
Log header	DMSLogRecordHeader	0(6)
Padding	char[ ]	6(2)
RID	sqlint32	8(4)
New Record length	unsigned short	12(2)
Free space	unsigned short	14(2)
Record offset	unsigned short	16(2)
Old record header and data	variable	18(variable)
Log header	DMSLogRecordHeader	variable(6)
Padding	char[ ]	variable(2)
RID	sqlint32	variable(4)
Old record length	unsigned short	variable(2)
Free space	unsigned short	variable(2)
Record offset	unsigned short	variable(2)
New record header and data	variable	variable(variable)
Total Length: 36 bytes plus 2 Record lengths		

Long Field Manager Log Records

Long field manager log records are written only if a database is configured with LOG RETAIN on or USEREXITS enabled. They are written whenever long field data is inserted, deleted, or updated.

To conserve log space, long field data inserted into tables is not logged if the database is configured for circular logging. In addition, when a long field value is updated, the before image is shadowed and not logged.

Long Field Manager Log Records

All long field manager log records begin with a header.

All long field manager log record offsets are from the end of the log manager log record header.

When a table has been altered to capture LONG VARCHAR OR LONG VARGRAPHIC columns (by specifying INCLUDE LONGVAR COLUMNS on the ALTER TABLE statement):

- The long field manager will write the appropriate long field log record.
- When long field data is updated, the update is treated as a delete of the old long field value, followed by an insert of the new value.
- When tables with long field columns are updated, but the long field columns themselves are not updated, a Non-update Long Field Record is written.
- The Delete Long Field Record and the Non-update Long Field Record are information only log records.

Table 110. Long Field Manager Log Record Header (LongFieldLogRecordHeader)

Description	Type	Offset (Bytes)
Originator code (component identifier = 3)	unsigned char	0(1)
Operation type[a]	unsigned char	1(1)
Pool identifier	unsigned short	2(2)
Object identifier	unsigned short	4(2)
Parent pool identifier[b]	unsigned short	6(2)
Parent object identifier[c]	unsigned short	8(2)
Total Length: 10 bytes		

[a] Valid operation type values and definitions:

```
Operation type value     Long Field Log Record Type

  110                     Add Long Field Record
  111                     Delete Long Field Record
  112                     Non-Update Long Field Record
```

[b] Pool ID of the data object

[c] Object ID of the data object

Add/Delete/Non-update Long Field Record

These log records are written whenever long field data is inserted, deleted, or updated. The length of the data is rounded up to the next 512-byte boundary.

Table 111. Add/Delete/Non-update Long Field Record Log Record Structure

Description	Type	Offset (Bytes)
Log header	LongFieldLogRecordHeader	0(10)
Long field length[a]	unsigned short	10(2)
File offset[b]	sqluint32	12(4)
Long field data	char[ ]	16(variable)

[a] Long field data length in 512-byte sectors (actual data length is not logged). The value of this field is always positive. The long field manager never writes log records for zero length long field data that is being inserted, deleted, or updated.

[b] 512-byte sector offset into long field object where data is to be located.

LOB Manager Log Records

LOB manager log records are written only if a database is configured with LOG RETAIN on or USEREXITS enabled. The log records are written whenever LOB data is inserted into a table. When LOB data is updated, the update is treated as a delete of the old LOB value, followed by an insert of the new value. If the LOB manager is able to determine that the new value is simply the old value with new data appended to it, the new data is appended to the old data. In this case, only the new data is logged.

For LOB columns that were created with the NOT LOGGED option, a log record is still written if the database is forward recoverable. However, instead of logging the actual data, only the quantity of data and its position within the LOB object are logged. During forward recovery, zeros (not user data) are written to the LOB object.

For any LOB value inserted, multiple LOB records may be written. A single LOB record will not contain more than 32 768 bytes of data.

In order to conserve log space, LOB data inserted into tables is not logged if the database is configured for circular logging. In addition, when a LOB value is updated, the before image is shadowed and not logged.

All LOB manager log records begin with a log record header.

All LOB manager log record offsets are from the end of the log manager log record header.

Table 112. LOB Manager Log Record Header Structure

Description	Type	Offset (Bytes)
Originator code (component identifier = 5)	unsigned char	0(1)
Operation identifier	unsigned char	1(1)
Pool identifier	unsigned short	2(2)
Object identifier	unsigned short	4(2)
Parent pool identifier	unsigned short	6(2)
Parent object identifier	unsigned short	8(2)
Object type	unsigned char	10(1)
Total Length: 11 bytes		

Insert LOB Data Log Record (AFIM_DATA)

This log record is written when LOB data is inserted into a LOB column, or appended to an existing LOB value, and logging of the data has been specified.

Table 113. Insert LOB Data Log Record (AFIM_DATA)

Description	Type	Offset (Bytes)
Log header	LOBLogRecordHeader	0(11)
Padding	char	11(1)
Data length	sqluint32	12(4)
Byte address in object	double	16(8)
LOB data	variable	24(variable)
Total Length: 24 bytes plus LOB data		

Insert LOB Data Log Record (AFIM_AMOUNT)

This log record is written instead of the AFIM_DATA log record if logging for the LOB column has been turned off.

Table 114. Insert LOB Data Log Record (AFIM_AMOUNT)

Description	Type	Offset (Bytes)
Log header	LOBLogRecordHeader	0(11)
Padding	char	11(1)
Data length	sqluint32	12(4)
Byte address in object	double	16(8)
Total Length: 24 bytes		

Transaction Manager Log Records

The transaction manager produces log records signifying the completion of transaction events (for example, commit or rollback). The time stamps in the log records are in Coordinated Universal Time (CUT), and mark the time (in seconds) since January 01, 1970.

Normal Commit

This log record is written for XA transactions in a single-node environment, or on the coordinator node in MPP. It is only used for XA applications. The log record is written when a transaction commits after one of the following events:

- A user has issued a COMMIT
- An implicit commit occurs during a CONNECT RESET.

Table 115. Normal Commit Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction committed	sqluint32	20(4)
Authorization identifier of the application[a]	char [ ]	24(variable)
Total Length: 24 bytes plus variable propagatable (24 bytes non-propagatable)		
[a] If the log record is marked as propagatable		

Heuristic Commit

This log record is written when an indoubt transaction is committed.

Table 116. Heuristic Commit Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction committed	sqluint32	20(4)
Authorization identifier of the application[a]	char [ ]	24(variable)
Total Length: 24 bytes plus variable propagatable (24 bytes non-propagatable)		
[a] If the log record is marked as propagatable		

MPP Coordinator Commit

This log record is written on a coordinator node for an application that performs updates on at least one subordinator node.

Table 117. Heuristic MPP Coordinator Commit Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)

Table 117. Heuristic MPP Coordinator Commit Log Record Structure (continued)

Description	Type	Offset (Bytes)
Time transaction committed	sqluint32	20(4)
MPP identifier of the transaction	SQLP_GXID	24(20)
Maximum node number	unsigned short	44(2)
TNL	unsigned char [ ]	46(max node number/8 + 1)
Authorization identifier of the application[a]	char [ ]	variable(variable)
Total Length: variable		
[a] If the log record is marked as propagatable		

MPP Subordinator Commit

This log record is written on a subordinator node in MPP.

Table 118. MPP Subordinator Commit Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction committed	sqluint32	20(4)
MPP identifier of the transaction	SQLP_GXID	24(20)
Authorization identifier[a]	char [ ]	44(variable)
Total Length: 44 bytes plus variable propagatable (44 bytes non-propagatable)		
[a] If the log record is marked as propagatable		

Normal Abort

This log record is written when a transaction aborts after one of the following events:

- A user has issued a ROLLBACK
- A deadlock occurs
- An implicit rollback occurs during crash recovery
- An implicit rollback occurs during ROLLFORWARD recovery.

Table 119. Normal Abort Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Authorization identifier of the application[a]	char [ ]	20(variable)
Total Length: 20 bytes plus variable (20 bytes non-propagatable)		
[a] If the log record is marked as propagatable		

Heuristic Abort

This log record is written when an indoubt transaction is aborted.

Table 120. Heuristic Abort Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Authorization identifier of the application[a]	char [ ]	20(variable)
Total Length: 20 bytes plus variable (20 bytes non-propagatable)		
[a] If the log record is marked as propagatable		

Local Pending List

This log record is written if a transaction commits and a pending list exists. The pending list is a linked list of non-recoverable operations (such as deletion of a file) that can only be performed when the user/application issues a COMMIT. The variable length structure contains the pending list entries.

Table 121. Local Pending List Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction committed	sqluint32	20(4)
Authorization identifier length[a]	unsigned short	24(2)
Authorization identifier of the application[a]	char [ ]	26(variable)[b]
Pending list entries	variable	variable(variable)
Total Length: 26 bytes plus variables propagatable (24 bytes plus pending list entries non-propagatable)		
[a] If the log record is marked as propagatable [b] Variable based on Authorization identifier length		

Global Pending List

This log record is written if a transaction involved in a two-phase commit commits, and a pending list exists. The pending list contains non-recoverable operations (such as deletion of a file) that can only be performed when the user/application issues a COMMIT. The variable length structure contains the pending list entries.

Table 122. Global Pending List Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Authorization identifier length[a]	unsigned short	20(2)

Table 122. Global Pending List Log Record Structure (continued)

Description	Type	Offset (Bytes)
Authorization identifier of the application[a]	char [ ]	22(variable)[b]
Global pending list entries	variable	variable(variable)
Total Length: 22 bytes plus variables propagatable (20 bytes plus pending list entries non-propagatable)		
[a] If the log record is marked as propagatable [b] Variable based on Authorization identifier length		

XA Prepare

This log record is written for XA transactions in a single-node environment, or on the coordinator node in MPP. It is only used for XA applications. The log record is written to mark the preparation of the transaction as part of a two-phase commit. The XA prepare log record describes the application that started the transaction, and is used to recreate an indoubt transaction.

Table 123. XA Prepare Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction prepared	sqluint32	20(4)
Log space used by transaction	sqluint64	24(8)
Transaction Node List Size	sqluint32	32(4)
Transaction Node List	unsigned char [ ]	36(variable)
XA identifier of the transaction	SQLXA_XID	variable(140)
Application Information Length	sqluint32	variable(4)
Code Page Identifier	sqluint32	variable(4)
Transaction Start Time	sqluint32	variable(4)
Application name	char [ ]	variable(20)
Application identifier	char [ ]	variable(32)
Sequence number	char [ ]	variable(4)
Database alias used by client	char [ ]	240(20)
Authorization identifier	char [ ]	variable(variable)
Synclog information	variable	variable(variable)
Total Length: 264 bytes plus variables		

MPP Subordinator Prepare

This log record is written for MPP transactions on subordinator nodes. The log record is written to mark the preparation of the transaction as part of a two-phase commit. The MPP subordinator prepare log record describes the application that started the transaction, and is used to recreate an indoubt transaction.

Table 124. MPP Subordinator Prepare Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time Transaction Prepared	sqluint32	20(4)
Log space used by transaction	sqluint64	24(8)
Coordinator LSN	SQLP_LSN	32(6)
Padding	char [ ]	38(2)
MPP identifier of the transaction	SQLP_GXID	40(20)
Application Information Length	sqluint32	60(4)
Code page	sqluint32	64(4)
Transaction Start Time	sqluint32	68(4)
Application name	char [ ]	72(20)
Application identifier	char [ ]	92(32)
Sequence number	char [ ]	124(4)
Database alias used by client	char [ ]	128(20)
Authorization identifier	char [ ]	148(variable)
Total Length: 148 bytes plus variable		

Backout Free

This log record is used to mark the end of a backout free interval. The backout free interval is a set of log records that is not to be compensated if the transaction aborts. This log record contains only a 6-byte log sequence number (*complsn*, stored in the log record header starting at offset 20). When this log record is read during rollback (following an aborted transaction), *complsn* marks the next log record to be compensated.

Table 125. Migration Begin Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Complsn	SQLP_LSN	20(6)
Total Length: 26 bytes		

Utility Manager Log Records

The utility manager produces log records associated with the following DB2 common server utilities:

- Migration
- Load
- Backup
- Table space rollforward.

The log records signify the beginning or the end of the requested activity. All utility manager log records are marked as propagatable regardless of the tables that they affect.

Migration Begin

This log record is associated with the beginning of catalog migration.

Table 126. Migration Begin Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Migration start time	char[ ]	20(10)
Migrate from release	unsigned short	30(2)
Migrate to release	unsigned short	32(2)
Total Length: 34 bytes		

Migration End

This log record is associated with the successful completion of catalog migration.

Table 127. Migration End Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Migration end time	char[ ]	20(10)
Migrate to release	unsigned short	30(2)
Total Length: 32 bytes		

Load Start

This log record is associated with the beginning of a load.

Table 128. Load Start Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Log record identifier	sqluint32	20(4)
Pool identifier	unsigned short	24(2)

Table 128. Load Start Log Record Structure (continued)

Description	Type	Offset (Bytes)
Object identifier	unsigned short	26(2)
Flag	unsigned char	28(1)
Object pool list	variable	29(variable)
Total Length: 29 bytes plus variable		

Table Load Delete Start

This log record is associated with the beginning of the delete phase in a load operation. The delete phase is started only if there are duplicate primary key values.

Table 129. Table Load Delete Start Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Total Length: 20 bytes		

Load Delete Start Compensation

This log record is associated with the end of the delete phase in a load operation.

Table 130. Load Delete Start Compensation Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Total Length: 20 bytes		

Load Pending List

This log record is written when a load transaction commits. The pending list is a linked list of non-recoverable operations which are deferred until the transaction commits. No commit log record follows this transaction.

Table 131. Load Pending List Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Time transaction committed	sqluint32	20(4)
Authorization identifier of the application[a]	char[ ]	24(9)
Pending list entries	variable	33(variable)
Total Length: 33 bytes plus pending list entries propagatable (24 bytes plus pending list entries non-propagatable)		
[a] If the log record is marked as propagatable		

Backup End

This log record is associated with the end of a successful backup.

Table 132. Backup End Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Backup end time	sqluint32	20(4)
Total Length: 24 bytes		

Tablespace Rolled Forward

This log record is associated with table space ROLLFORWARD recovery. It is written for each table space that is successfully rolled forward.

Table 133. Table Space Rolled Forward Log Record Structure

Description	Type	Offset (Bytes)
Log header	LogManagerLogRecordHeader	0(20)
Table space identifier	unsigned short	20(2)
Total Length: 22 bytes		

Tablespace Roll Forward to PIT Begins

This log record is associated with table space ROLLFORWARD recovery. It marks the beginning of a table space rollforward to a point in time.

Table 134. Table Space Roll Forward to PIT Begins Log Record Structure

Description	Type	Offset (Bytes)
Time stamp for this log record.	sqluint32	0(4)
Time stamp to which table spaces are being rolled forward.	sqluint32	4(4)
Number of pools being rolled forward.	unsigned short	8(2)
Integer list of pool IDs that are being rolled forward.	int*numpools	10(variable)
Total Length: 10 bytes plus variable		

Tablespace Roll Forward to PIT Ends

This log record is associated with table space ROLLFORWARD recovery. It marks the end of a table space rollforward to a point in time.

Table 135. Table Space Roll Forward to PIT Ends Log Record Structure

Description	Type	Offset (Bytes)
Time stamp for this log record.	sqluint32	0(4)
Time stamp to which table spaces were rolled forward.	sqluint32	4(4)
A flag whose value is `TRUE` if the roll forward was successful, or `FALSE` if the roll forward was canceled.	int	8(4)
Total Length: 12 bytes		

Datalink Manager Log Records

Datalink manager log records are the result of DDL, DML, or completion of transaction events involving DATALINK columns. These log records are written only when the DDL or the DML involves DATALINK columns with the file link control attribute.

Table 136. Datalink Manager Log Record Header Structure (DLMLogRecordHeader)

Description	Type	Offset (Bytes)
Component identifier (=8)	unsigned char	0(1)
Function identifier[a]	unsigned char	1(1)
padding	char []	2(2)
Total Length: 6 bytes		

Definitions and Values
 	
[a] Valid function identifier values
`LINK_FILE 33 link file`
`UNLINK_FILE 34 unlink file`
`DELETE_GROUP 35 delete group`
`DELETE_PGROUP 36 delete pgroup`
`DLFM_PREPARE 37 DLFM prepare`		

Link File

The link file log record is written when an insert or an update on a table with a DATALINK column creates a link to a file. One log record is written for each new link that is created. This log record is only used for undo.

Table 137. Link File Log Record Structure

Description	Type	Offset (Bytes)
Log header	DLMLogRecordHeader	0(4)
ServerId	sqlint32	4(4)

Table 137. Link File Log Record Structure (continued)

Description	Type	Offset (Bytes)
ReadOnly	int	8(4)
AuthId	char []	12(8)
GroupId	char []	20(17)
padding	char []	37(1)
AccessControl	unsigned short	38(2)
PrefixId	char []	40(9)
padding	char []	49(3)
RecoveryId	char []	52(7)
padding	char []	59(1)
Time stamp	sqluint32	60(4)
StemNameLen	sqluint32	64(4)
StemName	variable	68(variable)
ServerNameLen[a]	sqluint32	variable(4)
PrefixNameLen[a]	sqluint32	variable(4)
ServeNamePrefixName[a]	variable	variable(variable)
Total Length: 68 plus StemNameLen if non-progagatable (76 plus StemNameLen plus ServerNameLen plus PrefixNameLen if propagatable)		
Note: [a]If the log record is propagatable.		

Unlink File

The unlink file log record is written when a delete or an update on a table with a DATALINK column drops a link to a file. One log record is written for each link that is dropped. This log record is only used for undo.

Table 138. Unlink File Log Record Structure

Description	Type	Offset (Bytes)
Log header	DLMLogRecordHeader	0(4)
ServerId	sqlint32	4(4)
PrefixId	char []	8(9)
padding	char []	17(3)
RecoveryId	char []	20(7)
padding	char []	27(1)
Time stamp	sqluint32	28(4)
StemNameLen	sqluint32	32(4)

Table 138. Unlink File Log Record Structure (continued)

Description	Type	Offset (Bytes)
StemName	variable	36(variable)
poolID[a]	unsigned short	variable(2)
objectID[a]	unsigned short	variable(2)
colNum[a]	unsigned short	variable(2)
padding[a]	char []	variable(2)
ServerNameLen[a]	sqluint32	variable(4)
PrefixNameLen[a]	sqluint32	variable(4)
ServerNamePrefixName[a]	variable	variable(variable)
Total Length: 36 plus StemNameLen if non-propagatable (52 plus StemNameLen plus ServerNameLen plus PrefixNameLen if propagatable)		
Note: [a]If the log record is propagatable.		

Delete Group

The delete group log record is written when a table with DATALINK columns (having the file link control attribute) is dropped. One log record is written for each such DATALINK column for each DB2 Data Links Manager configured to the database. For a given DB2 Data Links Manager, the log record is written only if that DB2 Data Links Manager has the group defined on it when the table is dropped. This log record is only used for undo.

Table 139. Delete Group Log Record Structure

Description	Type	Offset (Bytes)
Log header	DLMLogRecordHeader	0(4)
ServerId	sqlint32	4(4)
RecoveryId	char []	8(7)
padding	char []	15(1)
GroupId	char []	16(17)
padding	char []	33(3)
Total Length: 36 bytes		

Delete PGroup

The delete pgroup log record is written when a table space is dropped. One log record is written for each DB2 Data Links Manager configured to the database. For a given DB2 Data Links Manager, the log record is written only if that DB2 Data Links Manager has the pgroup defined on it when the table space is dropped. This log record is only used for undo.

Table 140. Delete PGroup Log Record Structure

Description	Type	Offset (Bytes)
Log header	DLMLogRecordHeader	0(4)
ServerId	sqlint32	4(4)
poolLifeLSN	SQLU_LSN	8(6)
poolId	unsigned short	14(2)
RecoveryId	char []	16(7)
padding	char []	23(1)
Total Length: 24 bytes		

DLFM Prepare

The DLFM prepare log record is written during the prepare phase, when a two-phase commit is used for transactions involving DB2 Data Links Managers. It is used to recreate a transaction for DB2 Data Links Managers that are in-doubt.

Table 141. DLFM Prepare Log Record Structure

Description	Type	Offset (Bytes)
Log header	DLMLogRecordHeader	0(4)
NumDLFMs	unsigned short	4(4)
ServerIds	variable	8(variable)
*Total Length: 8 bytes plus (NumDLFMs * 4)*		

Appendix G. Application Migration Considerations

This section describes issues that should be considered before migrating an application to Version 7.

There are four possible operating scenarios:

1. Running pre-Version 7 applications against databases that have not been migrated
2. Running pre-Version 7 applications against migrated databases
3. Updating applications with Version 7 APIs
4. Running Version 7 applications against migrated databases.

The first and the fourth are consistent operating environments that do not require qualification.

The second, in which only the databases have been migrated, should work without changes to any application, because back-level applications are supported. However, as with any new version, a small number of incompatibilities can occur, and these are described in the *Administration Guide*.

For the third scenario, in which applications are to be updated with Version 7 APIs, the following points should be considered:

- All pre-Version 7 APIs that have been discontinued in Version 7 are still defined in the Version 7 header files, so that older applications will compile and link with Version 7 headers.
- Discontinued APIs should be removed from applications as soon as possible to enable these applications to take full advantage of the new functions available in Version 7, and to position the applications for future enhancements.
- The names of the APIs listed below have changed because of new function in Version 7. Users should scan for these names in their application source code to identify the changes required following Version 7 migration of the application.

  APIs that are not listed do not require changes following migration of an application.

  Note that an application may contain the generic version of an API call, depending on the application programming language being used. In all cases, the generic version of the API name is identical to the C version of the name, with the exception that the fourth character is always **g**.

Changed APIs and Data Structures

Table 142. Back-level Supported APIs

API (Version)	Descriptive Name	New API (Version)
sqlbftsq (V2)	Fetch Tablespace Query	sqlbftpq (V5)
sqlbstsq (V2)	Single Tablespace Query	sqlbstpq (V5)
sqlbtsq (V2)	Tablespace Query	sqlbmtsq (V5)
sqlectdd (V2)	Catalog Database	sqlecadb (V5)
sqlepstr (V2)	Start Database Manager (DB2 Parallel Edition Version 1.2)	sqlepstart (V5)
sqlestar (V2)	Start Database Manager (DB2 Version 2)	sqlepstart (V5)
sqlestop (V2)	Stop Database Manager	sqlepstp (V5)
sqlerstd (V5)	Restart Database	db2DatabaseRestart (V6)
sqlmon (V6)	Get/Update Monitor Switches	db2MonitorSwitches (V7)
sqlmonss (V5)	Get Snapshot	db2GetSnapshot (V6)
sqlmonsz (V6)	Estimate Size Required for sqlmonss() Output Buffer	db2GetSnapshotSize (V7)
sqlmrset (V6)	Reset Monitor	db2ResetMonitorData (V7)
sqlubkup (V2)	Backup Database	sqlubkp (V5)
sqlugrpi (V2)	Get Row Partitioning Information (DB2 Parallel Edition Version 1.x)	sqlugrpn (V5)
sqluhcls (V5)	Close Recovery History File Scan	db2HistoryCloseScan (V6)
sqluhget (V5)	Retrieve DDL Information From the History File	db2HistoryGetEntry (V6)
sqluhgne (V5)	Get Next Recovery History File Entry	db2HistoryGetEntry (V6)
sqluhops (V5)	Open Recovery History File Scan	db2HistoryOpenScan (V6)
sqluhprn (V5)	Prune Recovery History File	db2Prune (V6)
sqluhupd (V5)	Update Recovery History File	db2HistoryUpdate (V6)
sqluqry (V5)	Load Query	db2LoadQuery (V6)
sqlursto (V2)	Restore Database	sqlurst (V5)
sqlxhcom (V2)	Commit an Indoubt Transaction	sqlxphcm (V5)
sqlxhqry (V2)	List Indoubt Transactions	sqlxphqr (V5)
sqlxhrol (V2)	Roll Back an Indoubt Transaction	sqlxphrl (V5)
SQLB-TBSQRY-DATA (V2)	Table space data structure.	SQLB-TBSPQRY-DATA (V5)
SQLEDBSTRTOPT (V2)	Start Database Manager data structure (DB2 Parallel Edition Version 1.2)	SQLE-START-OPTIONS (V5)
SQLUHINFO and SQLUHADM (V5)	History file data structures.	db2HistData (V6)

Table 143. Back-level Unsupported APIs

Name	Descriptive Name	APIs Supported in V7
sqlufrol/sqlgfrol	Roll Forward Database (DB2 Version 1.1)	sqluroll
sqluprfw	Rollforward Database (DB2 Parallel Edition Version 1.x)	sqluroll
sqlurfwd/sqlgrfwd	Roll Forward Database (DB2 Version 1.2)	sqluroll
sqlurllf/sqlgrfwd	Rollforward Database (DB2 Version 2)	sqluroll

Appendix H. Using the DB2 Library

The DB2 Universal Database library consists of online help, books (PDF and HTML), and sample programs in HTML format. This section describes the information that is provided, and how you can access it.

To access product information online, you can use the Information Center. For more information, see "Accessing Information with the Information Center" on page 653. You can view task information, DB2 books, troubleshooting information, sample programs, and DB2 information on the Web.

DB2 PDF Files and Printed Books

DB2 Information

The following table divides the DB2 books into four categories:

DB2 Guide and Reference Information
These books contain the common DB2 information for all platforms.

DB2 Installation and Configuration Information
These books are for DB2 on a specific platform. For example, there are separate *Quick Beginnings* books for DB2 on OS/2, Windows, and UNIX-based platforms.

Cross-platform sample programs in HTML
These samples are the HTML version of the sample programs that are installed with the Application Development Client. The samples are for informational purposes and do not replace the actual programs.

Release notes
These files contain late-breaking information that could not be included in the DB2 books.

The installation manuals, release notes, and tutorials are viewable in HTML directly from the product CD-ROM. Most books are available in HTML on the product CD-ROM for viewing and in Adobe Acrobat (PDF) format on the DB2 publications CD-ROM for viewing and printing. You can also order a printed copy from IBM; see "Ordering the Printed Books" on page 649. The following table lists books that can be ordered.

On OS/2 and Windows platforms, you can install the HTML files under the `sqllib\doc\html` directory. DB2 information is translated into different

languages; however, all the information is not translated into every language. Whenever information is not available in a specific language, the English information is provided

On UNIX platforms, you can install multiple language versions of the HTML files under the `doc/%L/html` directories, where *%L* represents the locale. For more information, refer to the appropriate *Quick Beginnings* book.

You can obtain DB2 books and access information in a variety of ways:

- "Viewing Information Online" on page 652
- "Searching Information Online" on page 656
- "Ordering the Printed Books" on page 649
- "Printing the PDF Books" on page 648

Table 144. DB2 Information

Name	Description	Form Number PDF File Name	HTML Directory
	DB2 Guide and Reference Information		
Administration Guide	*Administration Guide: Planning* provides an overview of database concepts, information about design issues (such as logical and physical database design), and a discussion of high availability.	SC09-2946 db2d1x70	db2d0
	Administration Guide: Implementation provides information on implementation issues such as implementing your design, accessing databases, auditing, backup and recovery.	SC09-2944 db2d2x70	
	Administration Guide: Performance provides information on database environment and application performance evaluation and tuning.	SC09-2945 db2d3x70	
	You can order the three volumes of the *Administration Guide* in the English language in North America using the form number SBOF-8934.		
Administrative API Reference	Describes the DB2 application programming interfaces (APIs) and data structures that you can use to manage your databases. This book also explains how to call APIs from your applications.	SC09-2947 db2b0x70	db2b0

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
Application Building Guide	Provides environment setup information and step-by-step instructions about how to compile, link, and run DB2 applications on Windows, OS/2, and UNIX-based platforms.	SC09-2948 db2axx70	db2ax
APPC, CPI-C, and SNA Sense Codes	Provides general information about APPC, CPI-C, and SNA sense codes that you may encounter when using DB2 Universal Database products. Available in HTML format only.	No form number db2apx70	db2ap
Application Development Guide	Explains how to develop applications that access DB2 databases using embedded SQL or Java (JDBC and SQLJ). Discussion topics include writing stored procedures, writing user-defined functions, creating user-defined types, using triggers, and developing applications in partitioned environments or with federated systems.	SC09-2949 db2a0x70	db2a0
CLI Guide and Reference	Explains how to develop applications that access DB2 databases using the DB2 Call Level Interface, a callable SQL interface that is compatible with the Microsoft ODBC specification.	SC09-2950 db2l0x70	db2l0
Command Reference	Explains how to use the Command Line Processor and describes the DB2 commands that you can use to manage your database.	SC09-2951 db2n0x70	db2n0
Connectivity Supplement	Provides setup and reference information on how to use DB2 for AS/400, DB2 for OS/390, DB2 for MVS, or DB2 for VM as DRDA application requesters with DB2 Universal Database servers. This book also details how to use DRDA application servers with DB2 Connect application requesters. Available in HTML and PDF only.	No form number db2h1x70	db2h1

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
Data Movement Utilities Guide and Reference	Explains how to use DB2 utilities, such as import, export, load, AutoLoader, and DPROP, that facilitate the movement of data.	SC09-2955 db2dmx70	db2dm
Data Warehouse Center Administration Guide	Provides information on how to build and maintain a data warehouse using the Data Warehouse Center.	SC26-9993 db2ddx70	db2dd
Data Warehouse Center Application Integration Guide	Provides information to help programmers integrate applications with the Data Warehouse Center and with the Information Catalog Manager.	SC26-9994 db2adx70	db2ad
DB2 Connect User's Guide	Provides concepts, programming, and general usage information for the DB2 Connect products.	SC09-2954 db2c0x70	db2c0
DB2 Query Patroller Administration Guide	Provides an operational overview of the DB2 Query Patroller system, specific operational and administrative information, and task information for the administrative graphical user interface utilities.	SC09-2958 db2dwx70	db2dw
DB2 Query Patroller User's Guide	Describes how to use the tools and functions of the DB2 Query Patroller.	SC09-2960 db2wwx70	db2ww
Glossary	Provides definitions for terms used in DB2 and its components. Available in HTML format and in the *SQL Reference*.	No form number db2t0x70	db2t0
Image, Audio, and Video Extenders Administration and Programming	Provides general information about DB2 extenders, and information on the administration and configuration of the image, audio, and video (IAV) extenders and on programming using the IAV extenders. It includes reference information, diagnostic information (with messages), and samples.	SC26-9929 dmbu7x70	dmbu7
Information Catalog Manager Administration Guide	Provides guidance on managing information catalogs.	SC26-9995 db2dix70	db2di

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
Information Catalog Manager Programming Guide and Reference	Provides definitions for the architected interfaces for the Information Catalog Manager.	SC26-9997 db2bix70	db2bi
Information Catalog Manager User's Guide	Provides information on using the Information Catalog Manager user interface.	SC26-9996 db2aix70	db2ai
Installation and Configuration Supplement	Guides you through the planning, installation, and setup of platform-specific DB2 clients. This supplement also contains information on binding, setting up client and server communications, DB2 GUI tools, DRDA AS, distributed installation, the configuration of distributed requests, and accessing heterogeneous data sources.	GC09-2957 db2iyx70	db2iy
Message Reference	Lists messages and codes issued by DB2, the Information Catalog Manager, and the Data Warehouse Center, and describes the actions you should take. You can order both volumes of the Message Reference in the English language in North America with the form number SBOF-8932.	Volume 1 GC09-2978 db2m1x70 Volume 2 GC09-2979 db2m2x70	db2m0
OLAP Integration Server Administration Guide	Explains how to use the Administration Manager component of the OLAP Integration Server.	SC27-0787 db2dpx70	n/a
OLAP Integration Server Metaoutline User's Guide	Explains how to create and populate OLAP metaoutlines using the standard OLAP Metaoutline interface (not by using the Metaoutline Assistant).	SC27-0784 db2upx70	n/a
OLAP Integration Server Model User's Guide	Explains how to create OLAP models using the standard OLAP Model Interface (not by using the Model Assistant).	SC27-0783 db2lpx70	n/a
OLAP Setup and User's Guide	Provides configuration and setup information for the OLAP Starter Kit.	SC27-0702 db2ipx70	db2ip
OLAP Spreadsheet Add-in User's Guide for Excel	Describes how to use the Excel spreadsheet program to analyze OLAP data.	SC27-0786 db2epx70	db2ep

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
OLAP Spreadsheet Add-in User's Guide for Lotus 1-2-3	Describes how to use the Lotus 1-2-3 spreadsheet program to analyze OLAP data.	SC27-0785 db2tpx70	db2tp
Replication Guide and Reference	Provides planning, configuration, administration, and usage information for the IBM Replication tools supplied with DB2.	SC26-9920 db2e0x70	db2e0
Spatial Extender User's Guide and Reference	Provides information about installing, configuring, administering, programming, and troubleshooting the Spatial Extender. Also provides significant descriptions of spatial data concepts and provides reference information (messages and SQL) specific to the Spatial Extender.	SC27-0701 db2sbx70	db2sb
SQL Getting Started	Introduces SQL concepts and provides examples for many constructs and tasks.	SC09-2973 db2y0x70	db2y0
SQL Reference, Volume 1 and Volume 2	Describes SQL syntax, semantics, and the rules of the language. This book also includes information about release-to-release incompatibilities, product limits, and catalog views. You can order both volumes of the *SQL Reference* in the English language in North America with the form number SBOF-8933.	Volume 1 SC09-2974 db2s1x70 Volume 2 SC09-2975 db2s2x70	db2s0
System Monitor Guide and Reference	Describes how to collect different kinds of information about databases and the database manager. This book explains how to use the information to understand database activity, improve performance, and determine the cause of problems.	SC09-2956 db2f0x70	db2f0
Text Extender Administration and Programming	Provides general information about DB2 extenders and information on the administration and configuring of the text extender and on programming using the text extenders. It includes reference information, diagnostic information (with messages) and samples.	SC26-9930 desu9x70	desu9

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
Troubleshooting Guide	Helps you determine the source of errors, recover from problems, and use diagnostic tools in consultation with DB2 Customer Service.	GC09-2850 db2p0x70	db2p0
What's New	Describes the new features, functions, and enhancements in DB2 Universal Database, Version 7.	SC09-2976 db2q0x70	db2q0
DB2 Installation and Configuration Information			
DB2 Connect Enterprise Edition for OS/2 and Windows Quick Beginnings	Provides planning, migration, installation, and configuration information for DB2 Connect Enterprise Edition on the OS/2 and Windows 32-bit operating systems. This book also contains installation and setup information for many supported clients.	GC09-2953 db2c6x70	db2c6
DB2 Connect Enterprise Edition for UNIX Quick Beginnings	Provides planning, migration, installation, configuration, and task information for DB2 Connect Enterprise Edition on UNIX-based platforms. This book also contains installation and setup information for many supported clients.	GC09-2952 db2cyx70	db2cy
DB2 Connect Personal Edition Quick Beginnings	Provides planning, migration, installation, configuration, and task information for DB2 Connect Personal Edition on the OS/2 and Windows 32-bit operating systems. This book also contains installation and setup information for all supported clients.	GC09-2967 db2c1x70	db2c1
DB2 Connect Personal Edition Quick Beginnings for Linux	Provides planning, installation, migration, and configuration information for DB2 Connect Personal Edition on all supported Linux distributions.	GC09-2962 db2c4x70	db2c4
DB2 Data Links Manager Quick Beginnings	Provides planning, installation, configuration, and task information for DB2 Data Links Manager for AIX and Windows 32-bit operating systems.	GC09-2966 db2z6x70	db2z6

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
DB2 Enterprise - Extended Edition for UNIX Quick Beginnings	Provides planning, installation, and configuration information for DB2 Enterprise - Extended Edition on UNIX-based platforms. This book also contains installation and setup information for many supported clients.	GC09-2964 db2v3x70	db2v3
DB2 Enterprise - Extended Edition for Windows Quick Beginnings	Provides planning, installation, and configuration information for DB2 Enterprise - Extended Edition for Windows 32-bit operating systems. This book also contains installation and setup information for many supported clients.	GC09-2963 db2v6x70	db2v6
DB2 for OS/2 Quick Beginnings	Provides planning, installation, migration, and configuration information for DB2 Universal Database on the OS/2 operating system. This book also contains installation and setup information for many supported clients.	GC09-2968 db2i2x70	db2i2
DB2 for UNIX Quick Beginnings	Provides planning, installation, migration, and configuration information for DB2 Universal Database on UNIX-based platforms. This book also contains installation and setup information for many supported clients.	GC09-2970 db2ixx70	db2ix
DB2 for Windows Quick Beginnings	Provides planning, installation, migration, and configuration information for DB2 Universal Database on Windows 32-bit operating systems. This book also contains installation and setup information for many supported clients.	GC09-2971 db2i6x70	db2i6
DB2 Personal Edition Quick Beginnings	Provides planning, installation, migration, and configuration information for DB2 Universal Database Personal Edition on the OS/2 and Windows 32-bit operating systems.	GC09-2969 db2i1x70	db2i1
DB2 Personal Edition Quick Beginnings for Linux	Provides planning, installation, migration, and configuration information for DB2 Universal Database Personal Edition on all supported Linux distributions.	GC09-2972 db2i4x70	db2i4

Table 144. DB2 Information (continued)

Name	Description	Form Number PDF File Name	HTML Directory
DB2 Query Patroller Installation Guide	Provides installation information about DB2 Query Patroller.	GC09-2959 db2iwx70	db2iw
DB2 Warehouse Manager Installation Guide	Provides installation information for warehouse agents, warehouse transformers, and the Information Catalog Manager.	GC26-9998 db2idx70	db2id
Cross-Platform Sample Programs in HTML			
Sample programs in HTML	Provides the sample programs in HTML format for the programming languages on all platforms supported by DB2. The sample programs are provided for informational purposes only. Not all samples are available in all programming languages. The HTML samples are only available when the DB2 Application Development Client is installed. For more information on the programs, refer to the *Application Building Guide*.	No form number	db2hs
Release Notes			
DB2 Connect Release Notes	Provides late-breaking information that could not be included in the DB2 Connect books.	See note #2.	db2cr
DB2 Installation Notes	Provides late-breaking installation-specific information that could not be included in the DB2 books.	Available on product CD-ROM only.	
DB2 Release Notes	Provides late-breaking information about all DB2 products and features that could not be included in the DB2 books.	See note #2.	db2ir

Notes:

1. The character *x* in the sixth position of the file name indicates the language version of a book. For example, the file name `db2d0e70` identifies the English version of the *Administration Guide* and the file name `db2d0f70` identifies the French version of the same book. The following letters are used in the sixth position of the file name to indicate the language version:

Language	Identifier
Brazilian Portuguese	b

Bulgarian	u
Czech	x
Danish	d
Dutch	q
English	e
Finnish	y
French	f
German	g
Greek	a
Hungarian	h
Italian	i
Japanese	j
Korean	k
Norwegian	n
Polish	p
Portuguese	v
Russian	r
Simp. Chinese	c
Slovenian	l
Spanish	z
Swedish	s
Trad. Chinese	t
Turkish	m

2. Late breaking information that could not be included in the DB2 books is available in the Release Notes in HTML format and as an ASCII file. The HTML version is available from the Information Center and on the product CD-ROMs. To view the ASCII file:
   - On UNIX-based platforms, see the `Release.Notes` file. This file is located in the `DB2DIR/Readme/%L` directory, where `%L` represents the locale name and `DB2DIR` represents:
     - `/usr/lpp/db2_07_01` on AIX
     - `/opt/IBMdb2/V7.1` on HP-UX, PTX, Solaris, and Silicon Graphics IRIX
     - `/usr/IBMdb2/V7.1` on Linux.
   - On other platforms, see the `RELEASE.TXT` file. This file is located in the directory where the product is installed. On OS/2 platforms, you can also double-click the **IBM DB2** folder and then double-click the **Release Notes** icon.

Printing the PDF Books

If you prefer to have printed copies of the books, you can print the PDF files found on the DB2 publications CD-ROM. Using the Adobe Acrobat Reader, you can print either the entire book or a specific range of pages. For the file name of each book in the library, see Table 144 on page 640.

You can obtain the latest version of the Adobe Acrobat Reader from the Adobe Web site at http://www.adobe.com.

The PDF files are included on the DB2 publications CD-ROM with a file extension of PDF. To access the PDF files:

1. Insert the DB2 publications CD-ROM. On UNIX-based platforms, mount the DB2 publications CD-ROM. Refer to your *Quick Beginnings* book for the mounting procedures.
2. Start the Acrobat Reader.
3. Open the desired PDF file from one of the following locations:
   - On OS/2 and Windows platforms:

     x:\doc*language* directory, where *x* represents the CD-ROM drive and *language* represent the two-character country code that represents your language (for example, EN for English).
   - On UNIX-based platforms:

     /*cdrom*/doc/*%L* directory on the CD-ROM, where */cdrom* represents the mount point of the CD-ROM and *%L* represents the name of the desired locale.

You can also copy the PDF files from the CD-ROM to a local or network drive and read them from there.

Ordering the Printed Books

You can order the printed DB2 books either individually or as a set (in North America only) by using a sold bill of forms (SBOF) number. To order books, contact your IBM authorized dealer or marketing representative, or phone 1-800-879-2755 in the United States or 1-800-IBM-4YOU in Canada. You can also order the books from the Publications Web page at http://www.elink.ibmlink.ibm.com/pbl/pbl.

Two sets of books are available. SBOF-8935 provides reference and usage information for the DB2 Warehouse Manager. SBOF-8931 provides reference and usage information for all other DB2 Universal Database products and features. The contents of each SBOF are listed in the following table:

Table 145. Ordering the printed books

SBOF Number	Books Included	
SBOF-8931	• Administration Guide: Planning • Administration Guide: Implementation • Administration Guide: Performance • Administrative API Reference • Application Building Guide • Application Development Guide • CLI Guide and Reference • Command Reference • Data Movement Utilities Guide and Reference • Data Warehouse Center Administration Guide • Data Warehouse Center Application Integration Guide • DB2 Connect User's Guide • Installation and Configuration Supplement • Image, Audio, and Video Extenders Administration and Programming • Message Reference, Volumes 1 and 2	• OLAP Integration Server Administration Guide • OLAP Integration Server Metaoutline User's Guide • OLAP Integration Server Model User's Guide • OLAP Integration Server User's Guide • OLAP Setup and User's Guide • OLAP Spreadsheet Add-in User's Guide for Excel • OLAP Spreadsheet Add-in User's Guide for Lotus 1-2-3 • Replication Guide and Reference • Spatial Extender Administration and Programming Guide • SQL Getting Started • SQL Reference, Volumes 1 and 2 • System Monitor Guide and Reference • Text Extender Administration and Programming • Troubleshooting Guide • What's New
SBOF-8935	• Information Catalog Manager Administration Guide • Information Catalog Manager User's Guide • Information Catalog Manager Programming Guide and Reference	• Query Patroller Administration Guide • Query Patroller User's Guide

DB2 Online Documentation

Accessing Online Help

Online help is available with all DB2 components. The following table describes the various types of help.

Type of Help	Contents	How to Access...
Command Help	Explains the syntax of commands in the command line processor.	From the command line processor in interactive mode, enter: `? command` where *command* represents a keyword or the entire command. For example, `? catalog` displays help for all the CATALOG commands, while `? catalog database` displays help for the CATALOG DATABASE command.
Client Configuration Assistant Help *Command Center Help* *Control Center Help* *Data Warehouse Center Help* *Event Analyzer Help* *Information Catalog Manager Help* *Satellite Administration Center Help* *Script Center Help*	Explains the tasks you can perform in a window or notebook. The help includes overview and prerequisite information you need to know, and it describes how to use the window or notebook controls.	From a window or notebook, click the **Help** push button or press the **F1** key.

Message Help	Describes the cause of a message and any action you should take.	From the command line processor in interactive mode, enter:
		`? XXXnnnnn`
		where *XXXnnnnn* represents a valid message identifier.
		For example, `? SQL30081` displays help about the SQL30081 message.
		To view message help one screen at a time, enter:
		`? XXXnnnnn | more`
		To save message help in a file, enter:
		`? XXXnnnnn > filename.ext`
		where *filename.ext* represents the file where you want to save the message help.

Type of Help	Contents	How to Access...
SQL Help	Explains the syntax of SQL statements.	From the command line processor in interactive mode, enter: `help statement` where *statement* represents an SQL statement. For example, `help SELECT` displays help about the SELECT statement. **Note:** SQL help is not available on UNIX-based platforms.
SQLSTATE Help	Explains SQL states and class codes.	From the command line processor in interactive mode, enter: `? sqlstate or ? class code` where *sqlstate* represents a valid five-digit SQL state and *class code* represents the first two digits of the SQL state. For example, `? 08003` displays help for the 08003 SQL state, while `? 08` displays help for the 08 class code.

Viewing Information Online

The books included with this product are in Hypertext Markup Language (HTML) softcopy format. Softcopy format enables you to search or browse the information and provides hypertext links to related information. It also makes it easier to share the library across your site.

You can view the online books or sample programs with any browser that conforms to HTML Version 3.2 specifications.

To view online books or sample programs:

- If you are running DB2 administration tools, use the Information Center.
- From a browser, click **File —>Open Page**. The page you open contains descriptions of and links to DB2 information:
  - On UNIX-based platforms, open the following page:

    `INSTHOME/sqllib/doc/%L/html/index.htm`

    where *%L* represents the locale name.
  - On other platforms, open the following page:

    `sqllib\doc\html\index.htm`

    The path is located on the drive where DB2 is installed.

If you have not installed the Information Center, you can open the page by double-clicking the **DB2 Information** icon. Depending on the system you are using, the icon is in the main product folder or the Windows Start menu.

Installing the Netscape Browser

If you do not already have a Web browser installed, you can install Netscape from the Netscape CD-ROM found in the product boxes. For detailed instructions on how to install it, perform the following:

1. Insert the Netscape CD-ROM.
2. On UNIX-based platforms only, mount the CD-ROM. Refer to your *Quick Beginnings* book for the mounting procedures.
3. For installation instructions, refer to the `CDNAV`*`nn`*`.txt` file, where *nn* represents your two character language identifier. The file is located at the root directory of the CD-ROM.

Accessing Information with the Information Center

The Information Center provides quick access to DB2 product information. The Information Center is available on all platforms on which the DB2 administration tools are available.

You can open the Information Center by double-clicking the Information Center icon. Depending on the system you are using, the icon is in the Information folder in the main product folder or the Windows **Start** menu.

You can also access the Information Center by using the toolbar and the **Help** menu on the DB2 Windows platform.

The Information Center provides six types of information. Click the appropriate tab to look at the topics provided for that type.

Tasks Key tasks you can perform using DB2.

Reference DB2 reference information, such as keywords, commands, and APIs.

Books DB2 books.

Troubleshooting
Categories of error messages and their recovery actions.

Sample Programs
Sample programs that come with the DB2 Application Development Client. If you did not install the DB2 Application Development Client, this tab is not displayed.

Web DB2 information on the World Wide Web. To access this information, you must have a connection to the Web from your system.

When you select an item in one of the lists, the Information Center launches a viewer to display the information. The viewer might be the system help viewer, an editor, or a Web browser, depending on the kind of information you select.

The Information Center provides a find feature, so you can look for a specific topic without browsing the lists.

For a full text search, follow the hypertext link in the Information Center to the **Search DB2 Online Information** search form.

The HTML search server is usually started automatically. If a search in the HTML information does not work, you may have to start the search server using one of the following methods:

On Windows
Click **Start** and select **Programs —> IBM DB2 —> Information —> Start HTML Search Server**.

On OS/2
Double-click the **DB2 for OS/2** folder, and then double-click the **Start HTML Search Server** icon.

Refer to the release notes if you experience any other problems when searching the HTML information.

Note: The Search function is not available in the Linux, PTX, and Silicon Graphics IRIX environments.

Using DB2 Wizards

Wizards help you complete specific administration tasks by taking you through each task one step at a time. Wizards are available through the Control Center and the Client Configuration Assistant. The following table lists the wizards and describes their purpose.

Note: The Create Database, Create Index, Configure Multisite Update, and Performance Configuration wizards are available for the partitioned database environment.

Wizard	Helps You to...	How to Access...
Add Database	Catalog a database on a client workstation.	From the Client Configuration Assistant, click **Add**.
Backup Database	Determine, create, and schedule a backup plan.	From the Control Center, right-click the database you want to back up and select **Backup —> Database Using Wizard**.

Wizard	Helps You to...	How to Access...
Configure Multisite Update	Configure a multisite update, a distributed transaction, or a two-phase commit.	From the Control Center, right-click the **Databases** folder and select **Multisite Update**.
Create Database	Create a database, and perform some basic configuration tasks.	From the Control Center, right-click the **Databases** folder and select **Create —> Database Using Wizard**.
Create Table	Select basic data types, and create a primary key for the table.	From the Control Center, right-click the **Tables** icon and select **Create —> Table Using Wizard**.
Create Table Space	Create a new table space.	From the Control Center, right-click the **Table Spaces** icon and select **Create —> Table Space Using Wizard**.
Create Index	Advise which indexes to create and drop for all your queries.	From the Control Center, right-click the **Index** icon and select **Create —> Index Using Wizard**.
Performance Configuration	Tune the performance of a database by updating configuration parameters to match your business requirements.	From the Control Center, right-click the database you want to tune and select **Configure Performance Using Wizard**. For the partitioned database environment, from the Database Partitions view, right-click the first database partition you want to tune and select **Configure Performance Using Wizard**.
Restore Database	Recover a database after a failure. It helps you understand which backup to use, and which logs to replay.	From the Control Center, right-click the database you want to restore and select **Restore —> Database Using Wizard**.

Setting Up a Document Server

By default, the DB2 information is installed on your local system. This means that each person who needs access to the DB2 information must install the same files. To have the DB2 information stored in a single location, perform the following steps:

1. Copy all files and subdirectories from `\sqllib\doc\html` on your local system to a Web server. Each book has its own subdirectory that contains all the necessary HTML and GIF files that make up the book. Ensure that the directory structure remains the same.

2. Configure the Web server to look for the files in the new location. For information, refer to the NetQuestion Appendix in the *Installation and Configuration Supplement*.
3. If you are using the Java version of the Information Center, you can specify a base URL for all HTML files. You should use the URL for the list of books.
4. When you are able to view the book files, you can bookmark commonly viewed topics. You will probably want to bookmark the following pages:
   - List of books
   - Tables of contents of frequently used books
   - Frequently referenced articles, such as the ALTER TABLE topic
   - The Search form

For information about how you can serve the DB2 Universal Database online documentation files from a central machine, refer to the NetQuestion Appendix in the *Installation and Configuration Supplement*.

Searching Information Online

To find information in the HTML files, use one of the following methods:

- Click **Search** in the top frame. Use the search form to find a specific topic. This function is not available in the Linux, PTX, or Silicon Graphics IRIX environments.
- Click **Index** in the top frame. Use the index to find a specific topic in the book.
- Display the table of contents or index of the help or the HTML book, and then use the find function of the Web browser to find a specific topic in the book.
- Use the bookmark function of the Web browser to quickly return to a specific topic.
- Use the search function of the Information Center to find specific topics. See "Accessing Information with the Information Center" on page 653 for details.

Appendix I. Notices

IBM may not offer the products, services, or features discussed in this document in all countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make

improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Canada Limited
Office of the Lab Director
1150 Eglinton Ave. East
North York, Ontario
M3C 1H7
CANADA

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information may contain examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information may contain sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

Each copy or any portion of these sample programs or any derivative work must include a copyright notice as follows:

© (your company name) (year). Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. _enter the year or years_. All rights reserved.

Trademarks

The following terms, which may be denoted by an asterisk(*), are trademarks of International Business Machines Corporation in the United States, other countries, or both.

ACF/VTAM
AISPO
AIX
AIX/6000
AIXwindows
AnyNet
APPN
AS/400
BookManager
CICS
C Set++
C/370
DATABASE 2
DataHub
DataJoiner
DataPropagator
DataRefresher
DB2
DB2 Connect
DB2 Extenders
DB2 OLAP Server
DB2 Universal Database
Distributed Relational Database Architecture
DRDA
eNetwork
Extended Services
FFST
First Failure Support Technology
IBM
IMS
IMS/ESA
LAN DistanceMVS
MVS/ESA
MVS/XA
Net.Data
OS/2
OS/390
OS/400
PowerPC
QBIC
QMF
RACF
RISC System/6000
RS/6000
S/370
SP
SQL/DS
SQL/400
System/370
System/390
SystemView
VisualAge
VM/ESA
VSE/ESA
VTAM
WebExplorer
WIN-OS/2

The following terms are trademarks or registered trademarks of other companies:

Microsoft, Windows, and Windows NT are trademarks or registered trademarks of Microsoft Corporation.

Java or all Java-based trademarks and logos, and Solaris are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Tivoli and NetView are trademarks of Tivoli Systems Inc. in the United States, other countries, or both.

UNIX is a registered trademark in the United States, other countries or both and is licensed exclusively through X/Open Company Limited.

Other company, product, or service names, which may be denoted by a double asterisk(**) may be trademarks or service marks of others.

Index

E

F

G

H

I

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Z

Contacting IBM

If you have a technical problem, please review and carry out the actions suggested by the *Troubleshooting Guide* before contacting DB2 Customer Support. This guide suggests information that you can gather to help DB2 Customer Support to serve you better.

For information or to order any of the DB2 Universal Database products contact an IBM representative at a local branch office or contact any authorized IBM software remarketer.

If you live in the U.S.A., then you can call one of the following numbers:

- 1-800-237-5511 for customer support
- 1-888-426-4343 to learn about available service options

Product Information

If you live in the U.S.A., then you can call one of the following numbers:

- 1-800-IBM-CALL (1-800-426-2255) or 1-800-3IBM-OS2 (1-800-342-6672) to order products or get general information.
- 1-800-879-2755 to order publications.

http://www.ibm.com/software/data/
The DB2 World Wide Web pages provide current DB2 information about news, product descriptions, education schedules, and more.

http://www.ibm.com/software/data/db2/library/
The DB2 Product and Service Technical Library provides access to frequently asked questions, fixes, books, and up-to-date DB2 technical information.

Note: This information may be in English only.

http://www.elink.ibmlink.ibm.com/pbl/pbl/
The International Publications ordering Web site provides information on how to order books.

http://www.ibm.com/education/certify/
The Professional Certification Program from the IBM Web site provides certification test information for a variety of IBM products, including DB2.

ftp.software.ibm.com
Log on as anonymous. In the directory /ps/products/db2, you can find demos, fixes, information, and tools relating to DB2 and many other products.

comp.databases.ibm-db2, bit.listserv.db2-l
These Internet newsgroups are available for users to discuss their experiences with DB2 products.

On Compuserve: GO IBMDB2
Enter this command to access the IBM DB2 Family forums. All DB2 products are supported through these forums.

For information on how to contact IBM outside of the United States, refer to Appendix A of the *IBM Software Support Handbook*. To access this document, go to the following Web page: http://www.ibm.com/support/, and then select the IBM Software Support Handbook link near the bottom of the page.

Note: In some countries, IBM-authorized dealers should contact their dealer support structure instead of the IBM Support Center.

Printed in the United States of America
on recycled paper containing 10%
recovered post-consumer fiber.

SC09-2947-00