IBM DB2 Universal Database

What's New

Version 5

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Before using this information and the product it supports, be sure to read the general information under Appendix A, "Notices" on page 25.

Contents

Parallel Features

DB2 Version 5 includes parallel features as described in the following sections:

- "DB2 Version 5 Parallel Features"
- "Symmetric Multi-Processor (SMP) Enhancements"

DB2 Version 5 Parallel Features

The features of DB2 Parallel Edition Version 1.2 are now available in DB2 Version 5.

DB2 Universal Database Extended Enterprise Edition, the new name for DB2 Parallel Edition, extends the ability of the database to be partitioned across multiple, independent computers connected by a LAN. To the end-user and application developer, the database still appears as a single database on a single computer. There are two main benefits that this provides. First, this enables an application to use a database that is simply too large for a single computer to handle efficiently. Second, SQL operations can operate in parallel on the individual database partitions, thereby speeding up the execution time of a single query or utility.

While enhancements to SQL commands and DB2 application programming interfaces (APIs) have been made and new commands and APIs have been added to support the parallel environment, most Data Manipulation Language (DML) commands are unchanged and users need not change their programs or SQL statements to run in the parallel environment. In addition, a new graphical administration tool is now available. *DB2 Extended Enterprise Edition Quick Beginnings* provides installing and configuring information.

The DB2 Parallel Edition Version 1.2 features that are now available in DB2 Version 5 are documented in the DB2 Version 5 product documentation.

Some restrictions apply to the DB2 Parallel Edition Version 1.2 features that are available in DB2 Version 5. They are documented in the following manuals:

- *Administration Guide*
- *SQL Reference*
- *API Reference*
- *Command Reference*
- *System Monitor Guide and Reference*

Symmetric Multi-Processor (SMP) Enhancements

Version 5 has the following SMP enhancements:

SMP Intra-Query Parallelism

I/O parallelism already provided in DB2 Version 2 has been enhanced. It now exploits CPU parallelism in a single SQL query. Technology is

introduced which exploits multiple processors of a symmetric
multiprocessor (SMP) to speed up the execution of a single SQL query.
Prior to this work, SMP exploitation was limited to that between multiple
queries and to parallel I/O. A key purpose of this technology is to exploit
the fact that disks, memory, and processors can be shared uniformly by
multiple processors in an SMP system. This provides two important
benefits:

- It allows workload to be divided more evenly among the processors,
  thereby achieving better scalability. This is possible since all
  processors have the choice to work on all data. This is analogous to a
  single queue serviced by multiple bank tellers.

- It provides flexibility in designing query execution strategies that is not
  possible with a shared nothing approach. For example, a correlated
  subquery can be executed by the same processor that executes the
  parent query.

See the *Administration Guide* for more information.

LOAD Utility

Support now exists for the LOAD utility to exploit multiple processors in
SMP machines.

While loading data into a table in a multinode nodegroup, the data files
must have been processed by the splitter utility db2split), which writes a
header to each file. Only ASC and DEL files may be used to load in a table
that exists on a multi-node nodegroup. In addition, you now have the option
to pick a set of partitions, which may be the same or different from the
partitions being loaded, to participate in the parallel split process. See the
Command Reference for more information.

As well, you can specify the degree of LOAD parallelism desired for CPU
and disk I/O. See the *Command Reference* and the *API Reference* for
more information.

Index Generation

Multiple processors of an SMP are now used to speed up the process of
generating an index. An index can be generated via the CREATE INDEX
statement, the addition of a primary key or unique constraint to a table, or
the REORG TABLE command.

See the *Command Reference* for more information.

BACKUP and RESTORE Utilities

Backup and restore of multiple table spaces on SMP machines are
performed in parallel.

See the *Command Reference* for more information.

Usability Enhancements

DB2 Version 5 includes the following usability enhancements:

- "Graphical Tools"
- "Connectivity and Protocol Configuration and Auto-Discovery" on page 5
- "Instance Profile Manager" on page 6
- "Licensing" on page 6

Graphical Tools

DB2 Version 5 provides the following graphical tools:

Control Center and SmartGuides

The Control Center (called Database Director in previous releases) has been significantly enhanced to provide greater ease of use. An administrator of a DB2 database is provided with the tools necessary to set up, manage, monitor, and tune the database. You can manage a stand-alone database, or multiple remote databases from a single point of control. In addition to management of database instances, databases, and table spaces, Control Center now includes management functions for schemas, tables, views, indexes, users, user groups, user-defined types, user-defined functions, triggers, and stored procedures, as well as the ability to discover databases on the systems being managed. The ability to explain SQL graphically has been enhanced.

Also new in Version 5 is a built-in Scheduler that allows a job to run unattended at a given time, every x hours / days / weeks / months, multiple times a week, or multiple times a month.

The Control Center now includes support for data replication setup, allowing registration of replication sources and definition of replication subscriptions. This function is part of the DB2 base engine.

Monitoring capabilities provide early warning of potential problems, or automated actions to correct problems discovered without human intervention.

Finally, the Control Center has been enhanced through the inclusion of SmartGuides, which step you through a task. SmartGuides are included for database performance configuration, create/restore/backup database, create table space, and create table.

The Control Center runs on OS/2, Windows NT, and Windows 95 platforms, from which you can administer DB2 databases on OS/2, Windows NT, AIX, HP-UX, and the Solaris Operating Environment and other Unix platforms.

In addition to the function described above, there is support for the management of DB2 Universal Database Extended Enterprise Edition

objects. There will also be additional performance monitoring views to monitor these objects.

See the online help that accompanies the database administrative tools for instructions for using the tools. See the *Administration Getting Started* for an introduction to DB2 database administration using the database administrative tools.

Enhanced Visual Explain

The new Portable Snapshot function in Visual Explain makes the explain snapshot from any platform usable by Visual Explain on any other platform. For example, an HP-UX snapshot can be viewed with a Windows NT client.

See the online help that accompanies Visual Explain for instructions on how to use the tool.

New GUI Command Center

The Command Center provides an interactive window that lets you perform tasks such as:

- Execute SQL statements, DB2 commands and operating system commands.

- See the execution result of the one or many SQL statements and DB2 commands in a result window. You can scroll through the results and save the output to a file.

- Save a sequence of SQL statements and DB2 commands to a script file. You can then schedule the script to run as a job. When a saved script is modified, all jobs dependent on the saved script inherit the new modified behavior.

- Recall and execute a script file

- See the execution plan and statistics associated with a SQL statement before execution. You do this by invoking Visual Explain with a simple click of a button in the interactive window.

- Get quick access to the database administrative tools such as the Control Center and the Scheduler from the main icons bar.

- Display all the command scripts known to the system through the Script Center , with summary information listed for each.

For complete information on all the commands see the *Command Reference*. The DB2 Client Application Enabler contains a subset of the Command Center functions. See the *Quick Beginnings* book for your platform for details.

See the online help that accompanies the Command Center for instructions on how to use the tool.

The earlier non-GUI CLP continues to be available on all platforms.

Connectivity and Protocol Configuration and Auto-Discovery

The task of connecting a client to databases on servers is now simplified! Many of the steps performed on the server and the client are now automated.

From the server, DB2 "auto-discovers" the protocols it has detected on the workstation. You select the appropriate protocol and tell DB2 to configure the server and client.

From the client, it is now much simpler to make a new database connectable. You can ask DB2 to "auto-discover" the databases available, and then you can select a database from that list and ask DB2 to configure it for connection.

The following interfaces help you do this:

- Server Communications Configuration

   From an instance in the Control Center, the Setup Communications option lets you configure a DB2 server instance and update the communications protocol settings to support connections to the instance's databases from remote clients. You can setup communications for a new instance, or maintain the communication configuration of an existing instance. Many of the required steps are automated. You simply need to select the communication protocols you wish to have the server instance support.

   Server Communications Configuration is available on OS/2, Windows NT, and Windows 95 systems.

- Client Configuration Assistant

   This assistant leads you through the steps necessary to configure and manage a DB2 client, while at the same time hiding many of the steps required by automating them. Once a database has been configured for connection using either the automated or manual method, you can perform other actions on it:

   - DB2 connection testing

   - Connection information maintenance

   - DB2 CLI/ODBC administration

   - Application binding

   - Remove a database.

   Connections can be configured to both DB2 Common Server databases and DRDA databases.

   The Assistant is available on OS/2, Windows NT, and Windows 95 systems. The Client Configuration Assistant does not configure remote clients.

See the *Quick Beginnings* book for your platform for details.

Instance Profile Manager

The DB2 environment variables are now consolidated into the DB2 Instance Profile Registry.

This helps you by:

- Supporting multiple environment profiles (one per instance)
- Providing a machine-wide default (global) profile
- Supporting a machine-wide default DB2 instance name
- Eliminating the need to re-boot the machine when a variable is modified
- Supporting user/application overrides
- Centralizing control of environment variables
- Providing a command line tool to modify the externalized variables
- Enabling remote administration via the command line and the graphical tools.

A new command, DB2SET, displays, sets, or removes DB2 profile variables. See the *Command Reference* for details.

Licensing

The usability surrounding entering a license key has been improved. In addition, a database administrator can now enable or disable counting concurrent users on some platforms (OS/2, Windows NT, Windows 95, and AIX).

See the *Quick Beginnings* book for your platform for details.

SQL Enhancements

DB2 Version 5 includes the following SQL enhancements:

- "Outer Join Support"
- "Additional Authorization Support"
- "REAL Data Type Support"
- "New CREATE SCHEMA and DROP SCHEMA Statements" on page 8
- "User-defined Table Functions Supported" on page 8
- "Unique Constraints Supported" on page 8
- "CUBE and ROLLUP Aggregations" on page 8
- "New RENAME TABLE Statement" on page 8
- "Friendly Arithmetic and Conversion" on page 9
- "Built-in Functions" on page 9
- "500 Table Columns" on page 9

All enhancements comply with the SQL92 Entry Level standards. Features from higher levels of SQL92 and the future SQL3 have also been added.

See the *SQL Reference* for details about the enhancements described in this section.

Outer Join Support

A left, right, and full outer join operation is now supported using SQL92 syntax; that is, a join operation whose result includes unmatched rows in addition to matching rows.

Additional Authorization Support

The following functionality has been added for authorization support:

- Column level UPDATE privilege.
- Column level REFERENCES privilege.
- WITH GRANT OPTION on GRANT (for tables/views/columns).
- PUBLIC privileges for static SQL and views.

REAL Data Type Support

A single-precision floating-point data type using the keyword REAL is now supported.

New CREATE SCHEMA and DROP SCHEMA Statements

A CREATE SCHEMA statement and a DROP SCHEMA statement are now supported. This allows privileges to be associated with the schema to control which users can create, alter, or drop objects in the schema.

User-defined Table Functions Supported

SQL users can now access data which is not stored in the relational format and make full use of the query capabilities of the relational database.

It is often difficult if not impossible to subject data from non-relational data stores to relational operations. User-defined table functions are an extension to SQL that address this issue. A table function is an external user-defined function that constructs a derived table. The program for the function can access data from the various sources and format it into a tabular form that is returned from the table function. Once the table function is written, it can be used in the FROM clause of queries. Table functions can be used not only to subject this external data to the power of SQL, but also to capture external data permanently into relational tables.

See the *Embedded SQL Programming Guide* for details.

Unique Constraints Supported

Unique constraint support has been added as follows:

- Support for one or more UNIQUE constraints on tables in addition to PRIMARY KEYs.

- Foreign keys can reference unique constraints

- Unique constraint checking is deferred to the end of statement

- Specified constraint names used as index names (applies to primary keys also).

CUBE and ROLLUP Aggregations

The GROUP BY clause has been extended to support "super groups". One type of super group is a "ROLLUP group"; a result set that contains "sub-total" and "overall total" rows in addition to the regular grouped rows. Another type of super group is a "CUBE group"; a result set that contains "cross-tabulation" rows in addition to all the rows that would be in a ROLLUP group for the same columns.

New RENAME TABLE Statement

Support is now provided for renaming an existing table while maintaining current authorizations and indexes from the source table on the renamed table.

Friendly Arithmetic and Conversion

Friendly arithmetic and conversion allow a query to proceed and provide some returned results even though some data items could not be evaluated. This function enhances compatibility with DB2 for OS/390.

Built-in Functions

The following built-in functions are now available:

- COUNT_BIG

  Returns the number of rows or values in a set of rows or values for tables with a large number of rows.

- GENERATE_UNIQUE

  Returns a unique value that can be used to provide unique values in a table.

500 Table Columns

Up to 500 columns in a table are now supported.

Application Development Enhancements

DB2 Version 5 includes the following application development enhancements:

- "Open Database Connectivity (ODBC) 3.0 Support"
- "Additional Support in the DB2 Precompiler and APIs"
- "User Defined Function (UDF) Enhancements"
- "Precompile and Bind Enhancements" on page 12
- "Support for Java Programming" on page 12

Open Database Connectivity (ODBC) 3.0 Support

The DB2 Call Level Interface (DB2 CLI) has been updated to the latest Microsoft ODBC 3.0 specifications. This enables ODBC 3.0 applications to run with DB2. Scrollable Cursor support has also been added.

See the *CLI Guide and Reference* for details.

Additional Support in the DB2 Precompiler and APIs

The following support has been added:

- DB2 API for REXX called SQLDB2. It provides REXX support for new and existing DB2 APIs that do not return any data except for the SQLCA.
- The TARGET option of the DB2 PREP command and the precompiler API now support BORLAND_C and BORLAND_CPLUSPLUS to create DB2 applications with the Borland C++ compiler on OS/2.
- Support for the 32–bit version of Micro Focus COBOL on the OS/2.

See the *API Reference* for a full description of DB2 APIs. See the *Embedded SQL Programming Guide* for a description of the precompiler options.

User Defined Function (UDF) Enhancements

Two enhancements have been made for table functions and scalar functions:

- A new CREATE FUNCTION specification of DBINFO] NO DBINFO enables the function creator to specify whether the UDF receives additional information as an argument.
- A new AS LOCATOR clause has been added to the parameter/result data type specified in the CREATE FUNCTION statement which is valid for large object (LOB) types and for distinct types based on the LOB types. Instead of passing the entire LOB value across the DB2 / UDF interface, a locator is passed. Five new APIs are available to UDFs in NOT FENCED mode only, enabling the UDFs to

directly manipulate the locators and (subsets of) the LOB values which they represent.

Depending on how a UDF needs to process a LOB value, this can result in a great improvement in both performance and in memory utilization.

- UDF runtime support is extended with OLE automation (controller part) to invoke external UDFs which are methods of OLE automation servers. OLE automation is the standard protocol for interoperability on Windows platforms.

See the *Embedded SQL Programming Guide* and the *SQL Reference* for details.

Precompile and Bind Enhancements

The precompile and bind enhancements are categorized as follows:

Long Host Variable Names

Long host variable names that correspond to the variable name length of the programming language are now supported. Host variable names can now be up to 255 characters in length for all DB2-supported languages.

SQL Statement Flagging

The grammar and all syntax rules (that do not require catalog access) of SQL statements are now checked and those not compliant with the SQL92 Entry Level standard are flagged.

Support for Java Programming

DB2 enables you to develop applications and applets that access and manipulate DB2 databases. DB2 makes this possible by providing support for the Sun Microsystem's Java Database Connectivity (JDBC) API. DB2 provides this support through a DB2 JDBC driver that comes with DB2. The JDBC API provides a standard way to access databases from Java code. Your Java code passes SQL statements as function arguments to the DB2 JDBC driver. The driver handles the JDBC API calls from your Java code.

You can also use the Java programming language to develop user-defined functions and stored procedures which run on the server.

See the *Embedded SQL Programming Guide* for details.

Performance, Capacity, and Memory Enhancements

DB2 Version 5 includes the following performance, capacity, and memory enhancements:

- "Index ANDing"
- "Star Joins"
- "Global SQL Cache"
- "Faster Restart"
- "Multiple Buffer Pools, Very Large Memory Support" on page 14
- "LOAD Improvements" on page 14
- "More Efficient Client/Server Communications" on page 14
- "Deferred Prepare" on page 14

Index ANDing

The performance has been improved for queries that use columns which are key columns of different indexes over the same table. DB2 uses dynamic bitmap technology to efficiently combine multiple indexes.

Star Joins

The performance of queries involving "star joins" has been improved. Star queries are characterized as multi-way joins between several small dimension tables and a large fact table. DB2's new star join algorithm exploits dynamic bitmaps to join a large fact table with a series of relatively small dimension tables, minimizing data I/O.

Global SQL Cache

The aim of the Global SQL Cache is to minimize the amount of catalog access required for sections of static SQL statements and to maximize the sharing of sections for dynamic DML statements by eliminating many of the previous restrictions. This is done by establishing a global cache shared by all agents connected to the same database or partition of a database (in the case of DB2 Universal Database Extended Enterprise Edition), in which sections for both static and dynamic SQL statements will be placed. This global cache acts as a public repository, or library, for different sections being used on the database at any given time.

Faster Restart

Enhancements have been made to speed up restart which means that database crash recovery is now faster. This enhancement also applies to rollforward recovery.

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Multiple Buffer Pools, Very Large Memory Support

Two enhancements have been made to the buffer manager: multiple buffer pools and extended storage.

You can now create multiple buffer pools of various sizes (number of pages) and assign table spaces to them using the CREATE BUFFERPOOL SQL statement. This provides the database administrator greater control of the data in memory.

In addition, support now exists for very large physical memory (64-bit memory support). DB2 exploits 64-bit systems and 32-bit systems capable of supporting greater than 4 GB of real memory.

See the *Administration Guide* for details.

LOAD Improvements

In addition to SMP exploitation of load, LOAD performance for DEL and ASC data has been improved for the simple column types char and int. Other performance improvements have been made for other data formats and column types.

LOAD now has a new MODIFIED BY option called FASTPARSE which provides further performance improvements. See the *Command Reference* for details.

More Efficient Client/Server Communications

The amount of traffic between a DB2 client and a DB2 server (including host databases through DB2 Connect) has been reduced. Use of the new deferred prepare on/off option provides a performance enhancement when accessing DB2 Universal Databases as well as DRDA databases running DB2 Connect to minimize network communication. It can benefit both DB2 Universal Database and DB2 Connect.

Deferred Prepare

Deferred prepare provides a performance enhancement when accessing DB2 and DRDA databases by combining the SQL PREPARE statement flow with the associated OPEN, DESCRIBE, or EXECUTE statement flow to minimize the inter-process or network flow.

When deferred prepare is enabled, DB2 defers sending out SQL PREPARE statements until the associated OPEN, DESCRIBE, or EXECUTE statement is issued by the application. A PREPARE that is not eligible for deferral can be sent immediately, and have its cursor opened at the same time. PREPARE statements that normally cannot be deferred or pre-OPEN can also be optimized if the appropriate option is set in the SET CLIENT API or precompiler option.

DRDA Enhancements

Distributed Relational Database Architecture (DRDA) allows communications between clients and servers among heterogeneous databases. The following set of enhancements have been implemented:

- "DRDA Using the TCP/IP Communications Protocol"
- "DRDA Two-phase Commit"
- "DRDA Multi-row Stored Procedures"

See the *DB2 Connect Enterprise Edition Quick Beginnings* and *DB2 Connect User's Guide* for details about the enhancements described in this sect ion.

DRDA Using the TCP/IP Communications Protocol

TCP/IP has been added as a second protocol (the other being SNA) over which DB2 Connect can communicate to host systems. Also, DB2 servers are enabled to accept incoming DRDA connections from the host using TCP/IP. In other words, DRDA Application Requester (AR) and DRDA Application Server (AS) functionality has been implemented using TCP/IP instead of SNA.

DRDA Two-phase Commit

DRDA two-phase commit for the DB2 DRDA Application Requester (DB2 Connect) over the TCP/IP communications protocol has been implemented.

In addition, applications running on the host (for example, DB2 for MVS/ESA applications) using SNA can invoke the two-phase commit processing involving both the host and DB2 Version 5 databases.

DRDA Multi-row Stored Procedures

The ability to execute stored procedures on DB2 for MVS/ESA Version 4.2 is greatly improved. Applications can now receive multiple open cursors from stored procedures executing on DB2 for OS/390 Version 5. Each cursor can have multiple rows.

Communications Enhancements

DB2 Version 5 includes the following communications enhancements:

- "Named Pipe Support in Windows"

Named Pipe Support in Windows

Named pipe is now a supported communication protocol between Windows 95 and Windows NT clients and servers.

The new command CATALOG NPIPE NODE lets you add a named pipe node entry to the node directory. The equivalent REXX API is provided.

See the *Quick Beginnings for Windows NT*, *Command Reference*, and *A PI Reference* for details.

Other Enhancements

DB2 Version 5 includes the following general enhancements:

- "LOAD and Import"
- "DCE Security"
- "DB2 Governor"
- "Table Space Recovery To a Point in Time" on page 20
- "Restore Subset of Table Spaces from Backup" on page 20
- "Query Table Space Enhancements" on page 20
- "Database and Directory Migration" on page 20
- "Authentication Enhancement" on page 21
- "FORCE Command" on page 21

LOAD and Import

A new option has been added for handling decimal data. MODIFIED BY IMPLIEDDECIMALPOINT allows Load and Import to insert an implied decimal point based on the column definition. Another new option, MODIFIED BY BINARYNUMERIC, allows all numeric data to be imported in binary or packed decimal format.

See the *Command Reference* for details.

DCE Security

Support is added for the Open Software Foundation's (OSF) Distributed Computing Environment (DCE) Security component for use in authentication of database users. This provides both a more secure authentication mechanism and more central management of users, passwords, and groups using the DCE architecture.

In addition, DCE Cell Directory support is available for DB2 for OS/2. The supported protocols are APPC, TCP/IP, NetBIOS, and IPX/SPX.

The restriction on AIX and other Unix platforms that the SYSADM_GROUP must be the primary group of the instance owner is removed.

See the *Administration Guide* for details.

DB2 Governor

The DB2 Governor lets you set rules that indicate how it is to handle application behavior. For example, it monitors resource usage by executing applications and if specified limits are exceeded, it reprioritizes query execution or issues the force command to terminate them.

In addition, the governor can be used to generate accounting records for executing application that can be used for chargeback accounting.

See the *Administration Guide* for details.

Table Space Recovery To a Point in Time

A selected subset of table spaces can now be rolled forward to a specified point in time. You can also restore a subset of the tablespaces from a tablespace backup.

See the *Administration Guide* and *Command Reference* for details.

Restore Subset of Table Spaces from Backup

You can now selectively choose the table spaces to be restored from the full database backup image.

See the *Administration Guide* and the *Command Reference* for details.

Query Table Space Enhancements

Various APIs and commands for querying table spaces and table space containers have been enhanced.

In addition, the LIST TABLESPACES command is enhanced to display the additional information when SHOW DETAIL is specified.

See the *Command Reference* and the *API Reference* for details.

Database and Directory Migration

Support is provided to allow back-level DB2 databases and directories to be converted to a format usable by DB2 Version 5. The following is a list of DB2 database releases that are supported in DB2 Version 5 database migration process:

- DB2 for OS/2 Version 1.x and Version 2.x to Version 5

- DB2 for AIX Version 1.x and Version 2.x to Version 5

- DB2 for HP-UX Version 2.x to Version 5

- DB2 for Solaris Operating Environment Version 2.x to Version 5

- DB2 for SINIX Version 2.x to Version 5

- DB2 for Windows NT Version 2.x to Version 5

- DB2 Universal Database Extended Enterprise Edition for AIX Version 1.x to Version 5

See the *Administration Guide* for details.

With the addition of all the new features in this release, some incompatibilies have been introduced. They are also described in the *Administration Guide*.

Authentication Enhancement

The "Trusted Clients" option is now enabled on all platforms when authentication type is CLIENT. It allows the administrator to choose whether to Trust All Clients (the default) or trust only those clients that come from systems where there is security inherent in the operating system.

See the *Quick Beginnings* book for your platform for details.

FORCE Command

The FORCE command has been modified so that on a DB2 Universal Database Extended Enterprise Edition system, any application can be forced from any database partition using the agent id (an identifier that uniquely identifies an application).

See the *Command Reference* for details.

Serviceability Enhancements

DB2 Version 5 includes the following serviceability enhancements:

- "DB2 Database Repair Tool"
- "DB2 Messages Improvements"

See the *Troubleshooting Guide* for additional details.

DB2 Database Repair Tool

Enhancements have been made to the DB2 Database Repair Tool (DB2DART), an analysis and repair tool, which provides improved DB2 serviceability.

DB2 Messages Improvements

The messages have been improved so that the location of the reported problem is defined more precisely, and so that they are clearer and more helpful.

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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.

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The DB2 World Wide Web pages provide current DB2 information about news, product descriptions, education schedules, and more. The DB2 Product and Service Technical Library provides access to frequently asked questions, fixes, books, and up-to-date DB2 technical information. (Note that this information may be in English only.)

Anonymous FTP Sites

ftp.software.ibm.com

Log on as anonymous. In the directory /ps/products/db2, you can find demos, fixes, information, and tools concerning DB2 and many related products.

Internet Newsgroups

comp.databases.ibm-db2, bit.listserv.db2-l

These newsgroups are available for users to discuss their experiences with DB2 products.

CompuServe

GO IBMDB2 to access the IBM DB2 Family forums

All DB2 products are supported through these forums.

> To find out about the IBM Professional Certification Program for DB2 Universal Database, go to http://www.software.ibm.com/data/db2/db2tech/db2cert.html

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DSMMOM397I '.EDF#CV' WAS IMBEDDED AT LINE 310 OF '.EDF#BCX5'
DSMMOM397I '.EDF#BCX5' WAS IMBEDDED AT LINE 680 OF '.EDF#END'
DSMMOM397I '.EDF#END' WAS IMBEDDED AT LINE 187 OF 'EDFPRF40'