IBM® DB2® Connect™
Personal Edition
for Linux®

IBM

Quick Beginnings

Version 7

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Personal Edition
for Linux®

Quick Beginnings

Version 7

Before using this information and the product it supports, be sure to read the general information under "Appendix H. Notices" on page 135.

Contents

Welcome to DB2 Connect!

The DB2 Connect Quick Beginnings books provide a focused introduction to the installation and configuration of DB2 Connect products.

This *Quick Beginnings* book will guide you through the planning, installation, and set up of a DB2 Connect Personal Edition workstation. Once the DB2 Connect Personal Edition workstation has been installed and configured, you will configure a connection from the workstation to a host or AS/400 DB2 server using the command line processor.

If you plan to use your DB2 Connect Personal Edition workstation to access a DB2 server that *does not* reside on a host or AS/400 system, you will also be guided through the steps required to establish these communications as well.

How This Book is Structured

Setting up DB2 Connect is a multi-step process. The sections in this book follow the typical sequence of tasks necessary to go from installing DB2 Connect to using client applications with your database.

The typical steps to installing and configuring DB2 Connect are as follows:

Step 1. Determine how you want to use DB2 Connect in your network. For the available options, see "Accessing Host or AS/400 DB2 Data using DB2 Connect Personal Edition" on page 4.

Step 2. Verify that you have the correct hardware and software prerequisites on both your workstation and the host database server. See "Chapter 2. Planning for Installation" on page 25 for prerequisites.

Step 3. Verify that your host or AS/400 database server is configured to accept connections from Distributed Relational Database Architecture (DRDA) Application Requesters such as DB2 Connect.

Step 4. Install your DB2 Connect software. You will use this workstation to configure and verify your host and AS/400 connections. For DB2 Connect installation instructions, see "Chapter 4. Installing and Configuring DB2 Connect Personal Edition for Linux" on page 31.

Step 5. After installation, you will establish the connection between DB2 Connect and your host or AS/400 database system.

Step 6. Bind the programs and utilities provided with DB2 Connect to your host or AS/400 database.

Step 7. You will need to test the connection.

Step 8. You are now ready to use DB2 Connect with all your applications. If you want to use this workstation to administer DB2 for OS/390, DB2 Connect, or DB2 Universal Database servers, install the DB2 Administration Client component of DB2 Connect. For more information, refer to the *Installation and Configuration Supplement* online document.

Step 9. Workstations that will be used for application development should have the DB2 Application Development Client installed. Refer to the *Installation and Configuration Supplement* online document for instructions on installing and configuring a DB2 Application Development Client.

Conventions

This book uses the following highlighting conventions:

- **Boldface** indicates commands or graphical user interface (GUI) controls such as names of fields, folders, icons, or menu choices.
- *Italics* indicates variables that you should replace with your own value. It is also used to indicate book titles and to emphasize words.
- Monospace indicates file names, directory paths, and examples of text you enter exactly as shown.

This icon marks a fast path. A fast path guides you to information specific to your configuration where multiple options are available.

This icon marks a tip. It provides additional information that can help you complete a task.

For a complete description of the DB2 library, see "Appendix G. Using the DB2 Library" on page 117.

- If you do not follow the documented installation method with the recommended defaults, it may be necessary to refer to the *Administration Guide* and the *Command Reference* to complete the installation and configuration.
- The term *Windows 32-bit operating systems* refers to Windows 95, Windows 98, Windows NT, or Windows 2000.
- The term *DB2 Connect workstation* refers to a DB2 Connect Personal Edition workstation.
- The term *Windows 9x* refers to Windows 95 or Windows 98.
- The term *DB2 client* refers to a DB2 Administration Client, DB2 Application Development Client, or a DB2 Run-Time Client.
- The term *DB2 Universal Database* refers to DB2 Universal Database on OS/2, UNIX, and Windows 32-bit operating systems, unless otherwise stated.

Part 1. Introduction to DB2 Connect

Chapter 1. About DB2 Connect

DB2 Connect provides connectivity to mainframe and midrange databases from Windows, OS/2, and UNIX-based platforms. You can connect to DB2 databases on AS/400, VSE, VM, MVS, and OS/390. You can also connect to non-IBM databases that comply with the Distributed Relational Database Architecture (DRDA).

The DB2 Connect Products
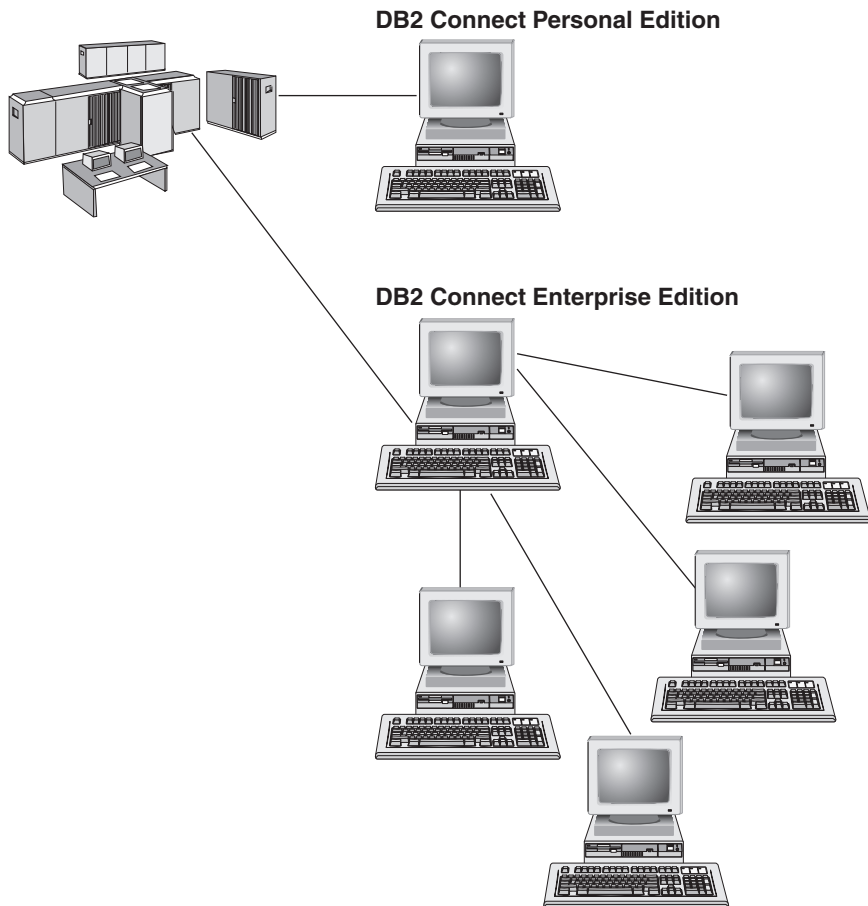
The following DB2 Connect products are available:

- Personal Edition
- Enterprise Edition

• Unlimited Edition

DB2 Connect Personal Edition provides a direct connection from one Windows, OS/2, or Linux operating system to mainframe and midrange databases. It is designed for a two-tier environment, where each client connects directly to the host. DB2 Connect Personal Edition does not accept inbound client requests for data.

DB2 Connect Enterprise Edition, installed on a gateway server, connects an entire LAN to mainframe and midrange databases. It is designed for a three-tier environment, where clients connect to a host through a gateway server.

DB2 Connect Unlimited Edition provides an unlimited number of DB2 Connect Personal Edition and DB2 Connect Enterprise Edition licenses. You get all of these licenses for one price, based on the size of the OS/390 system that is being accessed.

Working with DB2 Data

DB2 is a relational database system rich in features, many of which can be accessed remotely. In addition to allowing you to store your data, DB2 lets you issue requests to administer, query, update, insert, or delete data using local or remote client applications.

Accessing Host or AS/400 DB2 Data using DB2 Connect Personal Edition

A Direct connection without intermediate servers is a very convenient and desirable configuration. This is especially true for situations where the host or the AS/400 database server supports TCP/IP connectivity (for example, DB2 for OS/390 V5.1, or DB2 for AS/400 V4R2, or DB2 for VM 6.1). In such a configuration, each DB2 Connect workstation establishes a direct TCP/IP connection to DB2 for OS/390 or, for platforms with integrated SNA Support, connects via APPC to DB2 for MVS and other host and AS/400 databases.

TCP/IP connectivity requires that the host or AS/400 database support TCP/IP. DB2 for OS/390 V5.1, DB2/400 V4R2, and DB2 for VM V6.1 support native TCP/IP connections. An alternative to native TCP/IP is MPTN connectivity. MPTN connections require that IBM AnyNet products be installed on the target database system, but do not require the host or AS/400 database to provide native TCP/IP support.

Figure 1 on page 5 shows a workstation, with DB2 Connect Personal Edition installed, directly connected to a host or AS/400 database server.
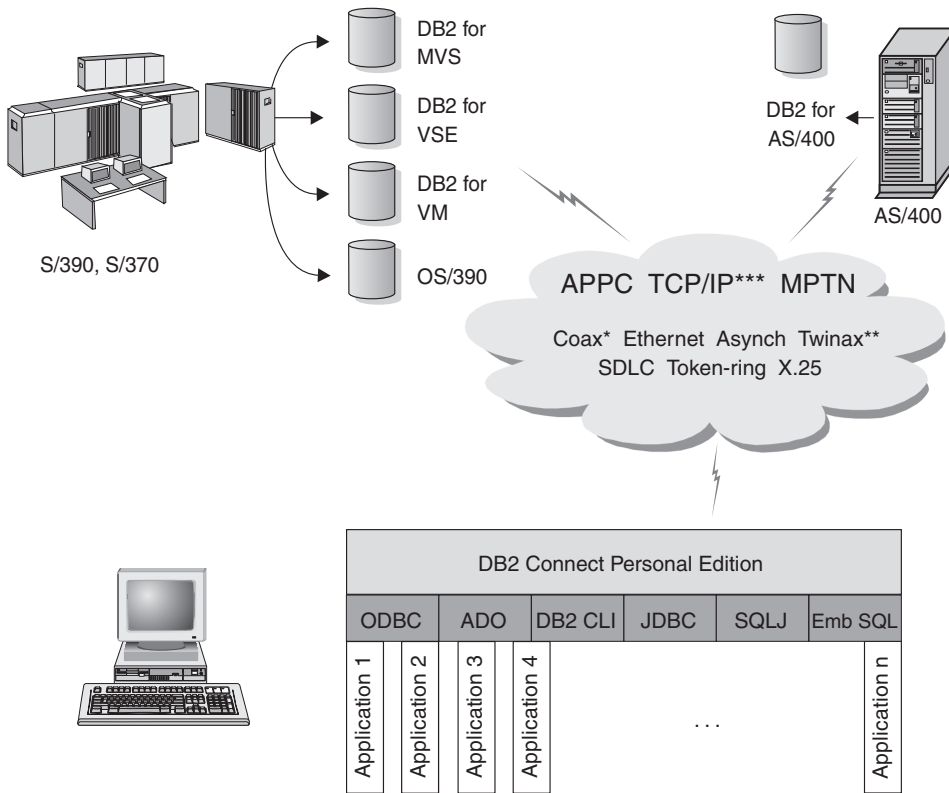
DB2 for
MVS

DB2 for
VSE

DB2 for
VM

OS/390

S/390, S/370

DB2 for
AS/400

AS/400

APPC TCP/IP*** MPTN

Coax* Ethernet Asynch Twinax**
SDLC Token-ring X.25

DB2 Connect Personal Edition					
ODBC	ADO	DB2 CLI	JDBC	SQLJ	Emb SQL

Application 1 Application 2 Application 3 Application 4 . . . Application n

Not all protocols are supported for all platforms.

* For Host connections only

** For AS/400

*** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2,
   or DB2 for VM V6.1

Figure 1. Direct Connection Between DB2 Connect and a host or AS/400 database server

In this environment, if you are using Windows 32-bit operating systems you can use the DB2 Connect Personal Edition Integrated SNA Support to connect directly to the host or AS/400 servers. DB2 Connect Integrated SNA Support permits connections over a variety of local and wide area networks, such as Token-Ring, Ethernet, SDLC, Twinax, Coax and Asynchronous dial-up.

The DB2 Connect Integrated SNA Support implements both APPC and MPTN connections over networks using hosts and AS/400 systems that have IBM AnyNet products installed. Users of OS/2 workstations can use IBM Personal Communications for OS/2, or IBM Communications Server for OS/2 to achieve direct APPC and MPTN connectivity.

Chapter 1. About DB2 Connect **5**

Connections via Communications Gateway

Some organizations prefer to concentrate access to SNA networks through dedicated **SNA Gateways**, such as IBM eNetwork Communications Server, Microsoft SNA Server, or Novell Netware for SAA. DB2 Connect products support connections through gateways, so this can be a good choice if you need terminal emulation and other SNA services not provided by DB2 Connect. Figure 2 on page 7 illustrates such a situation.
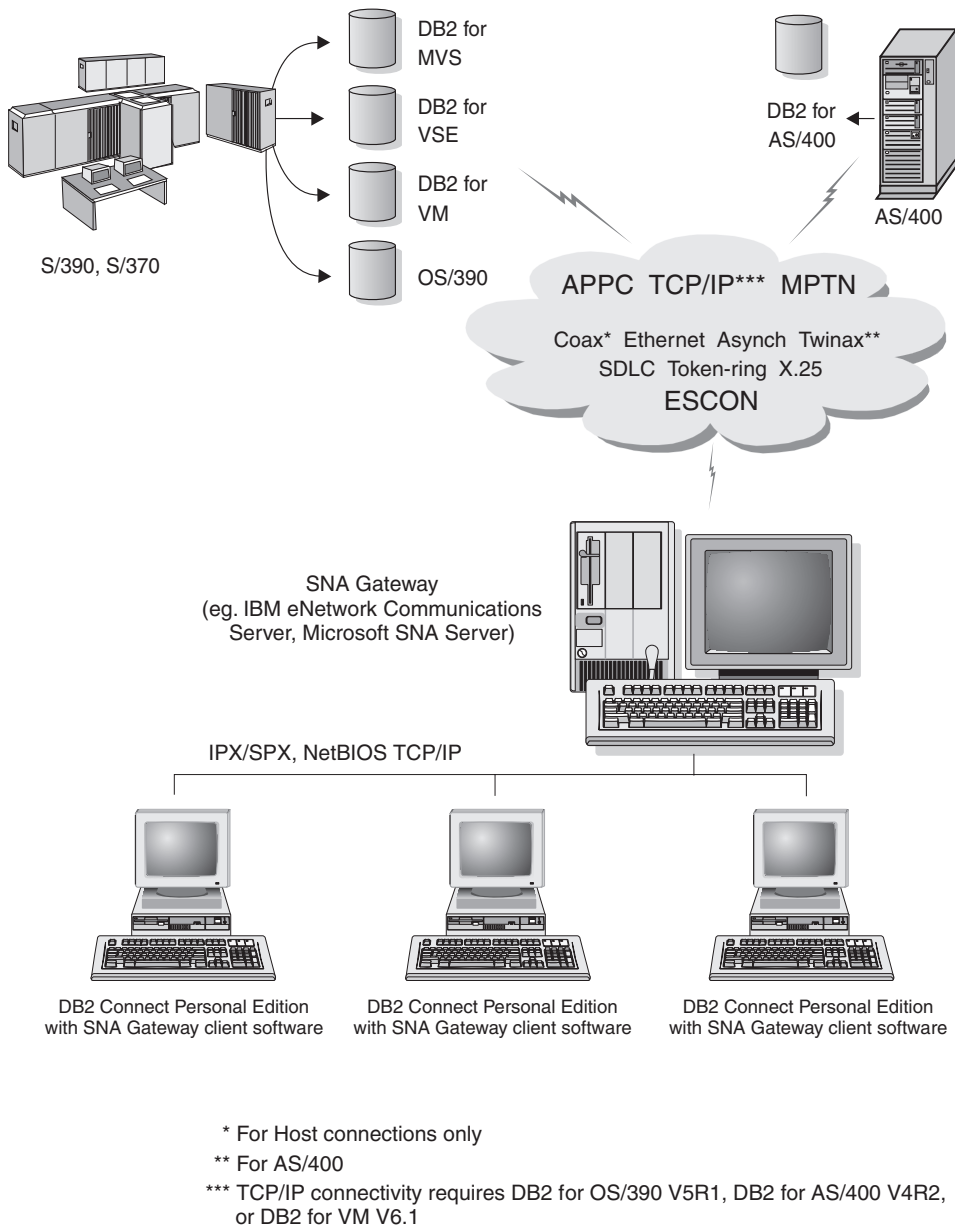
Figure 2. Indirect Connection to host or AS/400 database server via SNA Communications Gateway

> If you have many workstations that require access to your DB2 host or
> AS/400-based data sources, then you may want to use DB2 Connect EE with
> DB2 Clients, instead of DB2 Connect PE on every machine. DB2 Connect

Enterprise Edition can be installed on the same machine as IBM eNetwork Communications Server or Microsoft SNA Server, and in many cases it can provide a less expensive and better-performing solution.

Contact your authorized IBM reseller for additional information about DB2 Connect Enterprise Edition.

Accessing Host or AS/400 DB2 Data from the Desktop using DB2 Connect Enterprise Edition

A DB2 Connect server enables DB2 clients on a LAN access to data that is stored on host or AS/400 systems. DB2 Universal Database Enterprise Edition and DB2 Universal Database Enterprise - Extended Edition include the *DB2 Connect Server Support* component. All references to DB2 Connect Enterprise Edition also apply to the DB2 Connect Server Support component.

A great deal of the data in many large organizations is managed by DB2 for AS/400, DB2 for MVS/ESA, DB2 for OS/390, or DB2 for VSE & VM. Applications that run on any of the supported platforms can work with this data transparently, as if a local database server managed it. DB2 Connect Enterprise Edition is required for supporting applications which access host or AS/400 data and exploit transaction monitors (for example, IBM TxSeries CICS and Encina Monitor, Microsoft Transaction Server, BEA Tuxedo) as well as applications that are implemented as Java applets.

In addition, you can use a wide range of off-the-shelf or custom-developed database applications with DB2 Connect and its associated tools. For example, you can use DB2 Connect products with:

- *Spreadsheets*, such as Lotus 1-2-3 and Microsoft Excel, to analyze real-time data without having the cost and complexity of data extract and import procedures.
- *Decision support tools*, such as BusinessObjects, Brio and Impromptu, and Crystal Reports, to provide real-time information.
- *Database products*, such as Lotus Approach and Microsoft Access.
- *Development tools*, such as PowerSoft PowerBuilder, Microsoft Visual Basic, and Borland Delphi, to create client/server solutions.

DB2 Connect Enterprise Edition is most appropriate for environments where:

- Host and AS/400 database servers do not support native TCP/IP connectivity and direct connectivity from desktop workstations via SNA is not desirable (see Figure 3 on page 10).
- Application is implemented using data-aware Java applets (see Figure 7 on page 15).
- Web servers are used to implement web-based applications (see Figure 8 on page 17, Figure 7 on page 15 and Figure 6 on page 13).

- Middle-tier application server is employed.
- Transaction monitors such as IBM TxSeries CICS and Encina Monitor, IBM Component Broker, IBM MQSeries, Microsoft Transaction Server (MTS), and BEA Tuxedo are used. (See Figure 4 on page 11.)

DB2 Connect provides transparent access to host or AS/400 data through a standard architecture for managing distributed data. This standard is known as Distributed Relational Database Architecture (DRDA). DRDA allows your applications to establish a fast connection to host and AS/400 databases without expensive host components or proprietary gateways.

Although DB2 Connect is often installed on an intermediate server machine to connect DB2 clients to a host or AS/400 database, it is also installed on machines where multiple local users want to access the host or AS/400 servers directly. For example, DB2 Connect may be installed on a large machine with many local users.

DB2 Connect may also be installed on a Web server, Transaction Processor (TP) monitor, or other 3-tier application server machines with multiple local SQL application processes and threads. In these cases, you can choose to install DB2 Connect on the same machine for simplicity, or on a separate machine to off-load CPU cycles.

A DB2 Connect server enables multiple clients to connect to host or AS/400 data and can significantly reduce the effort that is required to establish and maintain access to enterprise data. Figure 3 on page 10 illustrates IBM's solution for environments in which you want to use a DB2 client making an indirect connection to a host or AS/400 database server through DB2 Connect Enterprise Edition.

In the example, you could replace the DB2 Connect server with a DB2 server that has the DB2 Connect Server Support component installed.
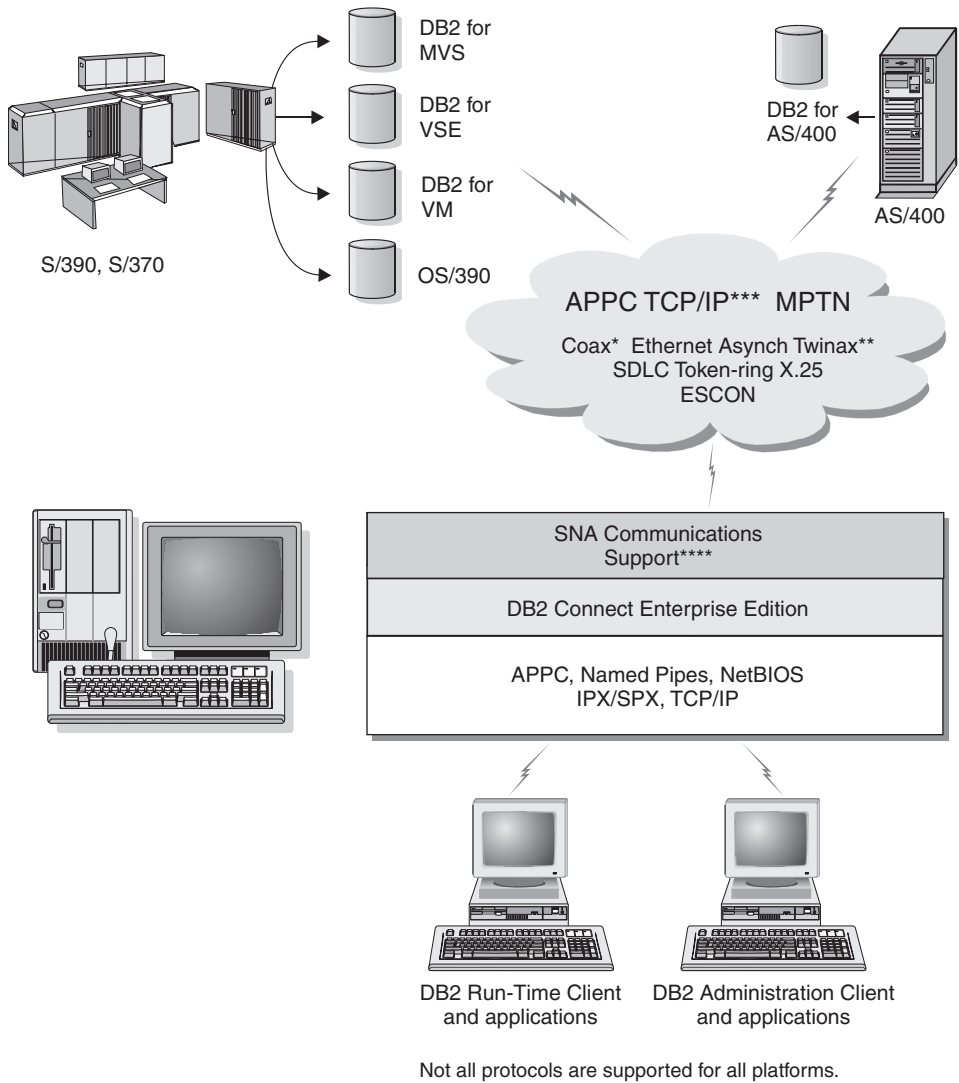
DB2 for
MVS

DB2 for
VSE

DB2 for
VM

OS/390

S/390, S/370

DB2 for
AS/400

AS/400

APPC TCP/IP*** MPTN

Coax* Ethernet Asynch Twinax**
SDLC Token-ring X.25
ESCON

SNA Communications
Support****

DB2 Connect Enterprise Edition

APPC, Named Pipes, NetBIOS
IPX/SPX, TCP/IP

DB2 Run-Time Client
and applications

DB2 Administration Client
and applications

Not all protocols are supported for all platforms.

* For Host connections only
** For AS/400
*** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2,
or DB2 for VM V6.1
**** SNA Comm Support is specific for each operating system and is required
only in cases where native TCP/IP conectivity is not available.

Figure 3. DB2 Connect Enterprise Edition
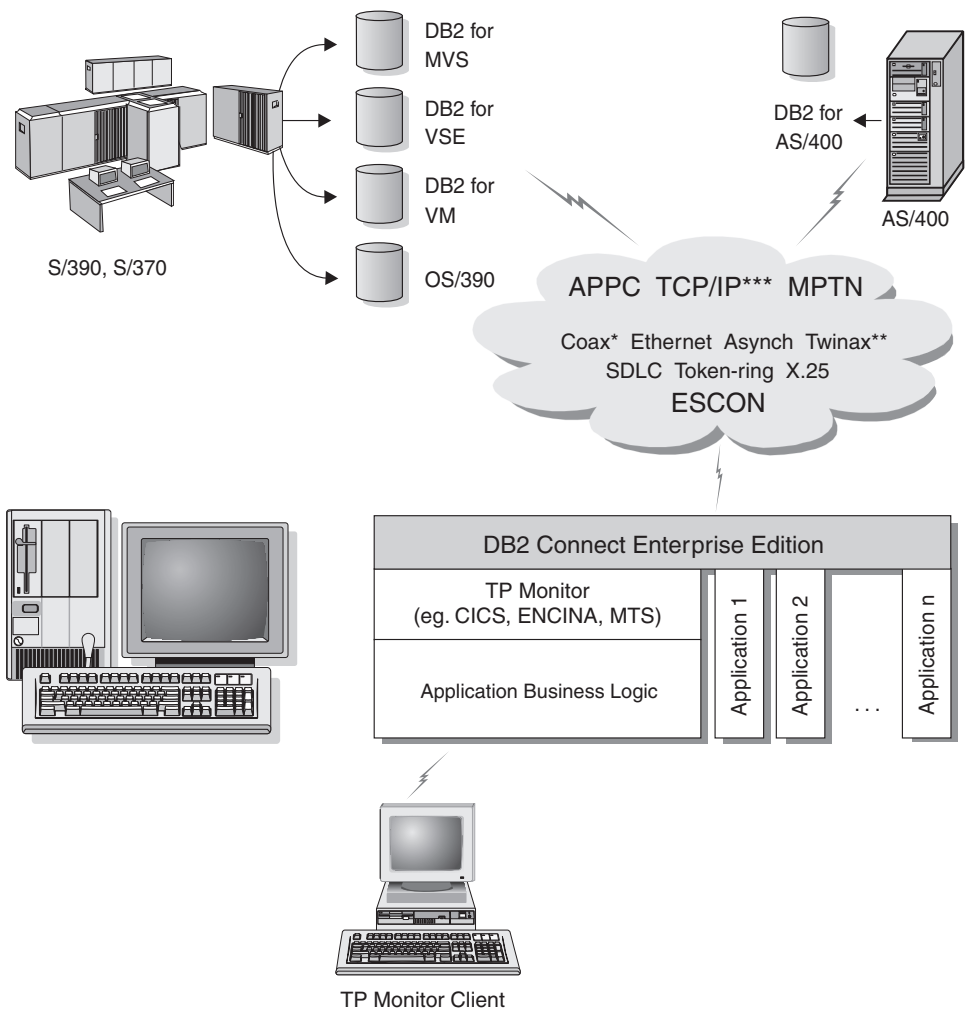
DB2 for
MVS

DB2 for
VSE

DB2 for
VM

OS/390

S/390, S/370

DB2 for
AS/400

AS/400

APPC TCP/IP*** MPTN

Coax* Ethernet Asynch Twinax**
SDLC Token-ring X.25
ESCON

DB2 Connect Enterprise Edition

TP Monitor
(eg. CICS, ENCINA, MTS)

Application Business Logic

Application 1

Application 2

. . .

Application n

TP Monitor Client

Not all protocols are supported for all platforms.

  * For Host connections only
 ** For AS/400
*** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2,
    or DB2 for VM V6.1

Figure 4. Using Transaction Monitors with DB2 Connect.

Not all protocols are supported for all platforms.

   * For Host connections only

  ** For AS/400

*** TCP/IP connectivity requires DB2 for OS/390 V5R1or later,
    DB2 for AS/400 V4R2 or later, or DB2 for VM V6.1

Figure 5. Java Server Support.

Not all protocols are supported for all platforms.

   * For Host connections only

  ** For AS/400

 *** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2, or DB2 for VM V6.1

Figure 6. DB2 Connect working with Microsoft Internet Information Server (IIS).

Accessing DB2 Data from the Web using Java

Java Database Connectivity (JDBC) and Embedded SQL for Java (SQLJ) are provided with DB2 to allow you to create applications that access data in DB2 databases from the Web.

Programming languages containing embedded SQL are called host languages. Java differs from the traditional host languages C, COBOL, and FORTRAN, in ways that significantly affect how it embeds SQL:

- SQLJ and JDBC are open standards, enabling you to easily port SQLJ or JDBC applications from other standards-compliant database systems to DB2 Universal Database.
- All Java types representing composite data, and data of varying sizes, have a distinguished value, null, which can be used to represent the SQL NULL state, giving Java programs an alternative to NULL indicators that are a fixture of other host languages.
- Java is designed to support programs that, by nature, are heterogeneously portable (also called "super portable" or simply "downloadable"). Along with Java's type system of classes and interfaces, this feature enables component software. In particular, an SQLJ translator written in Java can call components that are specialized by database vendors in order to leverage existing database functions such as authorization, schema checking, type checking, transactional, and recovery capabilities, and to generate code optimized for specific databases.
- Java is designed for binary portability in heterogeneous networks, which promises to enable binary portability for database applications that use static SQL.
- You can run JDBC applets inside a web page on any system with a Java-enabled browser, regardless of the platform of your client. Your client system requires no additional software beyond this browser. The client and the server share the processing of JDBC and SQLJ applets and applications.

The DB2 JDBC Applet server and the DB2 client must reside on the same machine as the Web server. The DB2 JDBC Applet server calls the DB2 client to connect to local, remote, host, and AS/400 databases. When the applet requests a connection to a DB2 database, the JDBC client opens a TCP/IP connection to the DB2 JDBC Applet on the machine where the Web server is running.
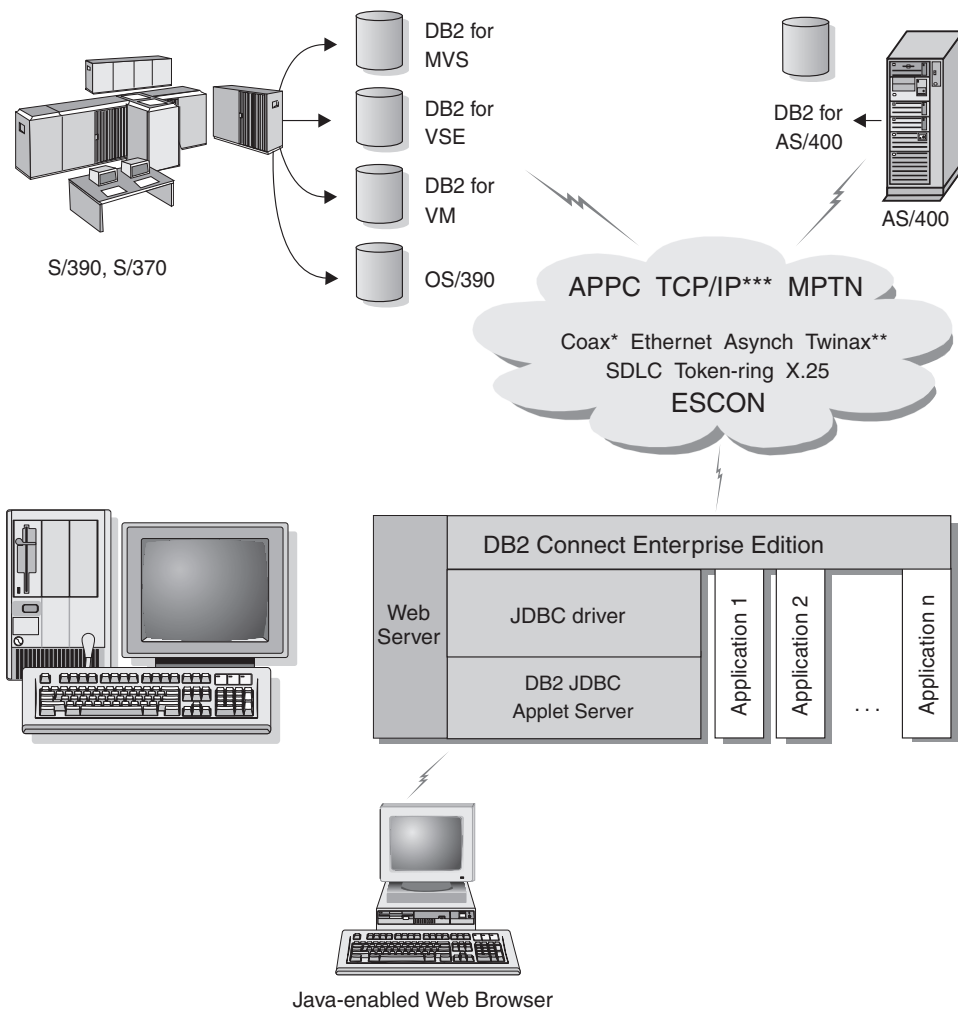
DB2 for
MVS

DB2 for
VSE

DB2 for
VM

OS/390

S/390, S/370

DB2 for
AS/400

AS/400

APPC TCP/IP*** MPTN

Coax* Ethernet Asynch Twinax**
SDLC Token-ring X.25
ESCON

DB2 Connect Enterprise Edition

Web
Server

JDBC driver

DB2 JDBC
Applet Server

Application 1

Application 2

. . .

Application n

Java-enabled Web Browser

Not all protocols are supported for all platforms.

* For Host connections only
** For AS/400
*** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2,
or DB2 for VM V6.1

Figure 7. Using Java Applets.

JDBC and SQLJ applications can be run from any system that has a DB2 client installed; a Web browser and a Web server are not required.

For more information on Java enablement, refer to the DB2 Java Enablement web page at http://www.ibm.com/software/data/db2/java/

For more information on the JDBC API, point your browser to http://splash.javasoft.com/

Accessing DB2 Data from the Web using Net.Data

Net.Data is provided with DB2 to allow you to create applications that access data in DB2 databases from the Web. You can use Net.Data to create applications that are stored on a Web server and viewable from any Web browser. While viewing these documents, users can either select automated queries or define new ones that retrieve the specified information directly from a DB2 database.

Automated queries do not require user input; they are links in an HTML document and, when selected, they trigger existing SQL queries and return the results from a DB2 database. These links can be triggered repeatedly to access current DB2 data. Customized queries require user input. Users define the search characteristics on the Web page by selecting options from a list or by entering values in fields. They submit the search by clicking on a push button. Net.Data uses the information that is supplied by the user to dynamically build a complete SQL statement, and it sends the query to the DB2 database.

A demonstration of Net.Data applications is available from the IBM Software Net.Data page at http://www.ibm.com/software/data/net.data

Net.Data can be installed with a:
- DB2 server to allow local access to databases.
- DB2 client to allow remote access to databases.

In both cases, Net.Data and the Web server must be installed on the same system.
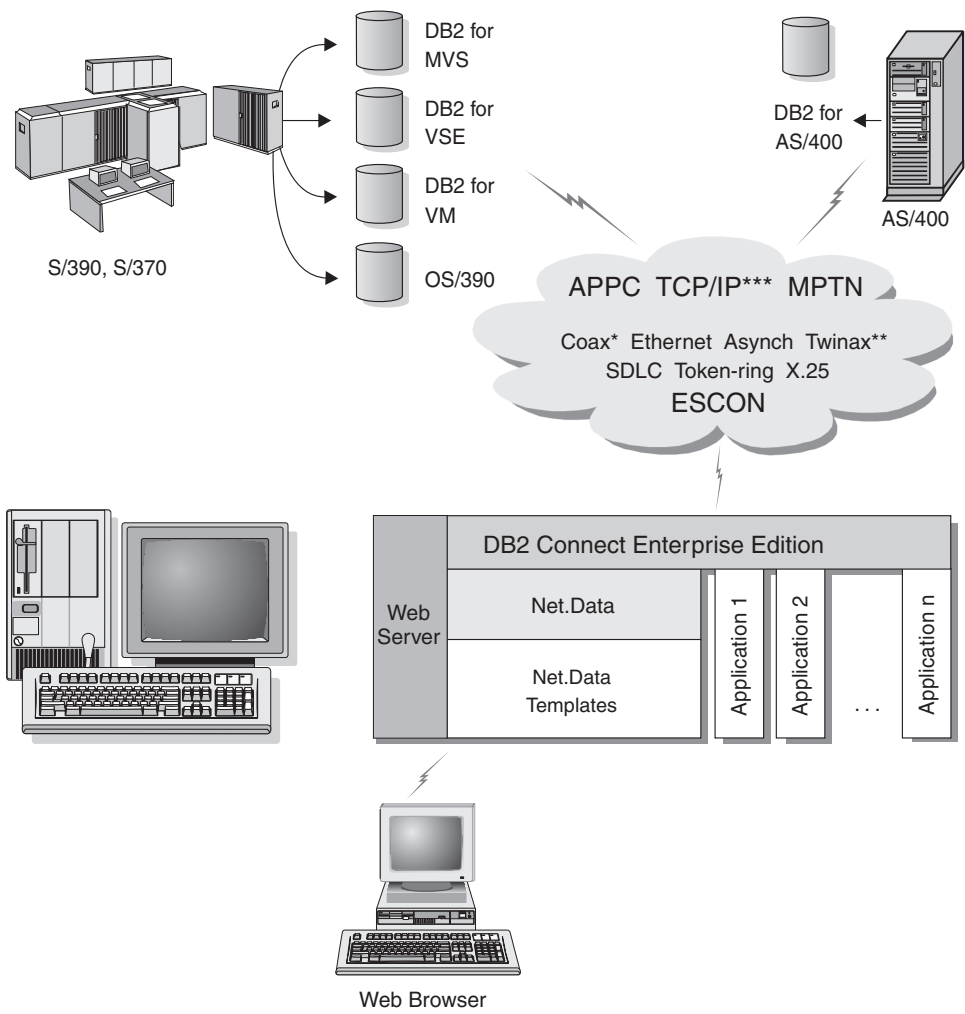
DB2 for
MVS

DB2 for
VSE

DB2 for
VM

OS/390

S/390, S/370

DB2 for
AS/400

AS/400

APPC TCP/IP*** MPTN

Coax* Ethernet Asynch Twinax**
SDLC Token-ring X.25
ESCON

DB2 Connect Enterprise Edition

Web
Server

Net.Data

Net.Data
Templates

Application 1

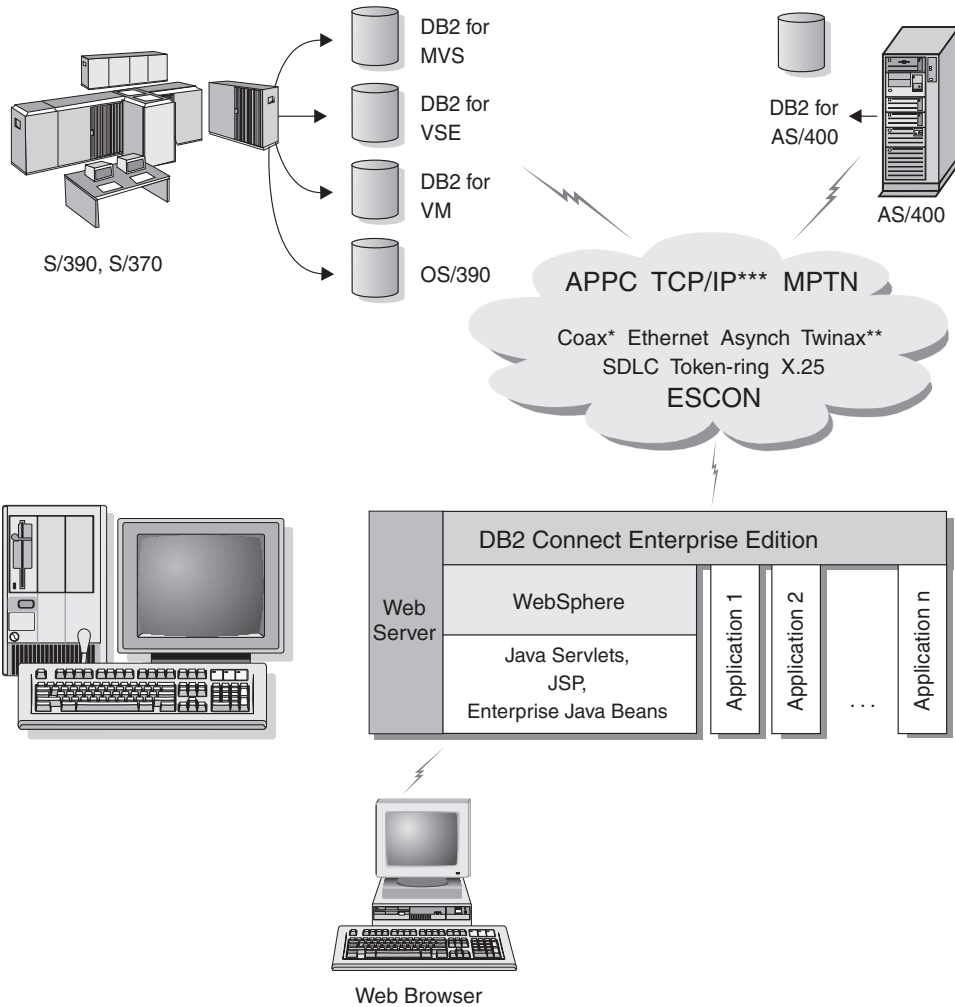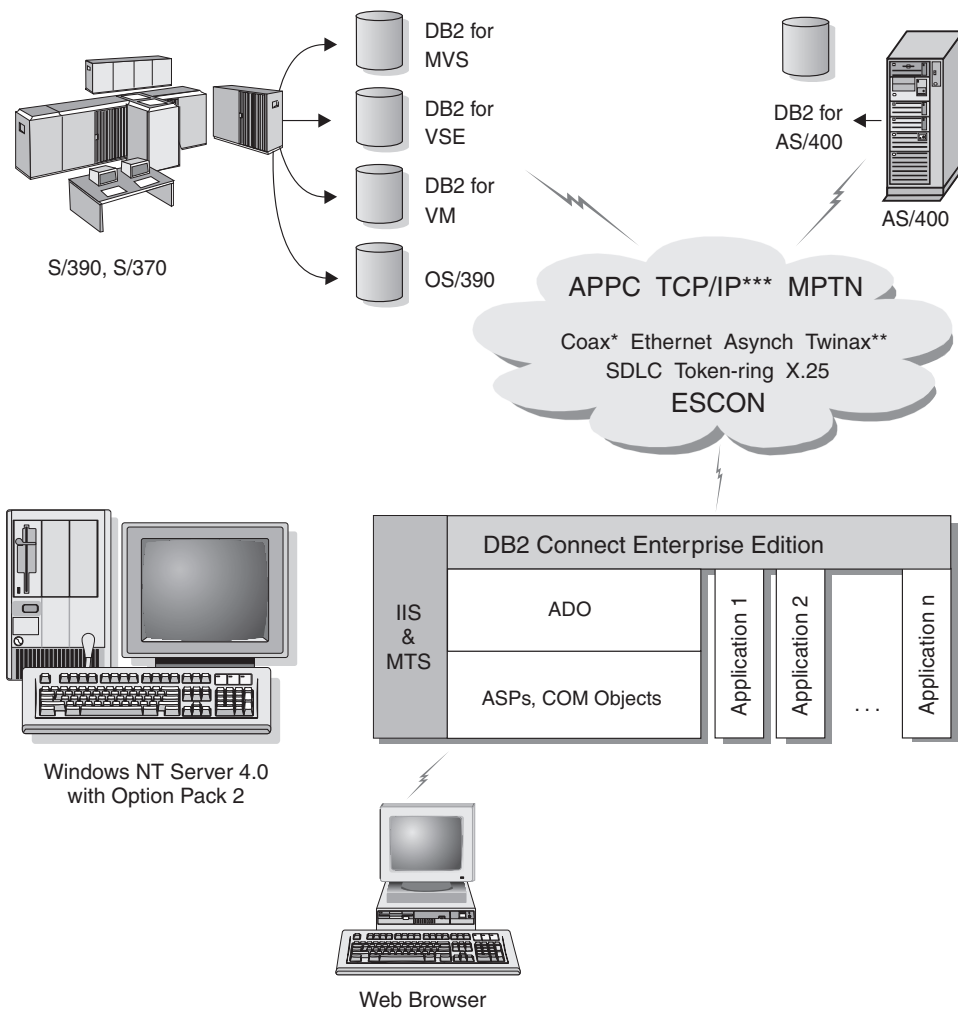Application 2

. . .

Application n

Web Browser

Not all protocols are supported for all platforms.

* For Host connections only
** For AS/400
*** TCP/IP connectivity requires DB2 for OS/390 V5R1, DB2 for AS/400 V4R2,
    or DB2 for VM V6.1

Figure 8. Net.Data with DB2 Connect.

Managing Connections to Databases using the Client Configuration Assistant

The Client Configuration Assistant (CCA) helps you manage your database connections to remote servers. The CCA is available on OS/2 and Windows 32-bit operating systems and this is the preferred method to set up any OS/2, Windows 9x, Windows NT, or Windows 2000 client to communicate with a server.

You can use the command line processor to set up DB2 clients on any platform. For more information, refer to the *Installation and Configuration Supplement*.

You can use the command line processor to set up DB2 clients on any platform. For more information, see "Chapter 10. Configuring Client to LAN-Based Server Communications Using the Command Line Processor" on page 83.

With the CCA, you can:

- Catalog databases so that they can be used by applications. Three methods are available:
  - Use a profile provided by a database administrator to automatically define your connections. Client access is automatically set up for that database.
  - Search the network for available databases and select one. Client access is automatically set up for that database. DB2 Connect Personal Edition is limited in that it cannot search for Host or AS/400 databases, except through a DB2 Connect Enterprise Edition server.
  - Manually configure a connection to a database by entering the required connection parameters.
- Remove cataloged databases, or change the properties of a cataloged database.
- Export and import client profiles that contain database and configuration information for a client.
- Test connections to local or remote databases identified on your system.
- Bind applications to a database by selecting utilities or bind files from a list.
- Tune the client configuration parameters on your system. Parameters are logically grouped and suggested settings are provided on the interface as parameters are selected.
- Export client configuration information to a profile.
- Import configuration information from a profile.
- Update the server password.

Managing Warehouses using the Data Warehouse Center

DB2 Universal Database offers the Data Warehouse Center, a component that automates data warehouse processing. You can use the Data Warehouse Center to define the data to include in the warehouse. Then, you can use the Data Warehouse Center to schedule automatic refreshes of the data in the warehouse.

From the Data Warehouse Center, you can manage specific warehousing objects, including subject areas, warehouse sources, warehouse targets, agents, agent sites, steps, and processes.

You can also perform the following tasks from the Data Warehouse Center:
- Define a subject area. You use a subject area to logically group the processes that are related to a particular topic or function.
- Explore the source data and define warehouse sources.
- Create database tables and define warehouse targets.
- Define a process that specifies how to move and transform the source data into the appropriate format for the warehouse.
- Test and schedule steps.
- Define security and monitor database currency.
- Define a star schema model.

Developing Applications using the Application Development Client

The Application Development Client is a collection of tools that are designed to meet the needs of database application developers. It includes libraries, header files, documented APIs, and sample programs to build character-based, multimedia, or object-oriented applications.

A platform-specific version of the DB2 Application Development Client is available on each server CD-ROM. In addition the Developer Edition boxes contain the Application Development Clients for multiple supported operating systems. The Personal Developer's Edition box contains the Application Development CD-ROMs for OS/2, Windows and Linux. The Universal Developer's Edition box contains the Application Development CD-ROMs for all supported operating systems.

Through a DB2 client, these applications can access all servers and, by using the DB2 Connect product (or the DB2 Connect functionality supplied with DB2 Enterprise - Extended or DB2 Enterprise Edition), they can also access DB2 Universal Database for AS/400, DB2 Universal Database for OS/390, and DB2 for VSE & VM database servers.

The Application Development Client allows you to develop applications that use the following interfaces:

- Embedded SQL
- Call Level Interface (CLI) development environment (which is compatible with ODBC from Microsoft)
- Java Database Connectivity (JDBC)
- Embedded SQL for Java (SQLJ)
- DB2 Application Programming Interfaces (APIs) that use administrative functions to manage a DB2 database.

The Application Development Client includes:

- Precompilers for Java, C, C++, COBOL, and FORTRAN.
- Libraries, include files, and code samples to develop applications that use SQLJ and DB2 CLI.
- A single control point for metadata management through the use of templates and tokens.
- JDBC and SQLJ support to develop Java applications and applets.
- Interactive SQL, through the CLP, to prototype SQL statements and perform ad-hoc database queries.
- An API to enable other application development tools to implement precompiler support for DB2 directly with their products.
- An SQL92 and MVS Conformance Flagger to identify embedded SQL statements in applications not conforming to the ISO/ANSO SQL92 Entry Level standard, or which are not supported by DB2 for OS/390.

For complete information on the functionality of the Application Development Client, and instructions on how to use them, as well as a full list of supported compilers for your platform, refer to the *Application Building Guide*.

Running Your Own Applications

Various types of applications can access DB2 databases:

- Applications developed using a Application Development Client that include embedded SQL (including Java SQLJ applications and applets), APIs, stored procedures, user-defined functions, calls to DB2 CLI, or calls to JDBC applications and applets.
- ODBC applications such as Lotus Approach, Microsoft Visual Basic, PowerSoft PowerBuilder, Borland Delphi and thousands more.
- Net.Data macros containing HTML and SQL.

The DB2 CLI/ODBC driver is an optional component during a DB2 client install. It is required to run CLI, ODBC, JDBC, and some SQLJ applications.

For more information on running your own applications, refer to the
Installation and Configuration Supplement.

Typical Steps Required to Install and Configure DB2 Connect

Setting up DB2 Connect is a multi-step process.

The typical steps to installing and configuring DB2 Connect Personal Edition
are as follows:

Step 1. Determine how you want to use DB2 Connect in your network. For
the available options, see "Accessing Host or AS/400 DB2 Data using
DB2 Connect Personal Edition" on page 4.

Step 2. Verify that you have the correct hardware and software prerequisites
on both your workstation and the host database server. See
"Chapter 2. Planning for Installation" on page 25 for prerequisites.

Step 3. Verify that your host or AS/400 database server is configured to
accept connections from DB2 Connect servers.

Step 4. Install your DB2 Connect software. You will use this workstation to
configure and verify your host and AS/400 connections. For DB2
Connect installation instructions, see "Chapter 4. Installing and
Configuring DB2 Connect Personal Edition for Linux" on page 31.

Step 5. After installation, establish the connection between DB2 Connect and
your host or AS/400 database system.

DB2 Connect Personal Edition ships with integrated SNA support. If
you need to manually configure the integrated SNA product, refer to
the *Installation and Configuration Supplement*.

Step 6. Bind the programs and utilities provided with DB2 Connect to your
host or AS/400 database.

Step 7. Test the connection.

Step 8. You are now ready to use DB2 Connect with all your applications.
Workstations that will be used for application development should
have the Application Development Client installed.

Step 9. If you want to use this workstation to administer DB2 for OS/390 or
DB2 Universal Database for UNIX, Windows NT, Windows 2000 or
OS/2 servers, install the DB2 Administration Client.

Part 2. DB2 Connect: Planning and Installation

Chapter 2. Planning for Installation

If you know that your system meets all hardware and software requirements, and you want to begin installing your DB2 product right away, go to "Chapter 4. Installing and Configuring DB2 Connect Personal Edition for Linux" on page 31.

For information on the DB2 family of products, see "Chapter 1. About DB2 Connect" on page 3.

There are many components that you might want to use in your environment. Use the product and planning information in this section to ensure that your system meets the prerequisites and to decide which components you want to install. If you are migrating from a previous version of DB2, there are also pre-installation migration tasks you should perform.

Before you begin your DB2 product installation, you should determine the requirements for the system that you are planning to install and configure.

Memory Requirements

The amount of memory that you require depends on the applications you intend to run. We suggest that you have a minimum of a 128 MB of memory and a minimum 128 MB of swap space to access host or AS/400 databases using DB2 Connect Personal Edition.

Disk Requirements

This section shows the *minimum* amount of disk space that is required to install your DB2 product and components. It does not include the disk requirements necessary for the operating system, application development tools, and communications products. Consult each product's documentation for these values. Estimates for disk space requirements are listed here; the actual amounts required depend on the functions you are using.

For information about space requirements for data, refer to the *Administration Guide*.

Estimating Fixed Disk Requirements

To estimate the disk requirements for a particular configuration, add the recommended minimum disk sizes for the products and components that you want to install. Include an allowance for your application data and indexes.

Components

Use Table 1 to estimate the amount of disk space you need to install your DB2 product and its associated components on your operating system.

Table 1. Estimating Disk Requirements

	Recommended Minimum Disk (MB)
DB2 Connect Personal Edition for Linux	
DB2 Connect Personal Edition for Linux (including the DB2 GUI Tools)	123 MB
Online documentation in HTML format (English)	100 MB
Total Disk Space Required	__ MB

Software Requirements

This section outlines the software required to run DB2 products.

Product Requirements

Table 2 lists the operating system and communications software required for DB2 Universal Database.

Table 2. Software Requirements

Product	Hardware/Software Requirements	Communications
		Linux
• DB2 Connect Personal Edition	• Linux kernel 2.2.12 or higher. • *glibc* Version 2.1.2 or higher. • *pdksh* package • *libstdc++* Version 2.9.0 To install DB2, you will need the Red Hat Package Manager (*rpm*).	TCP/IP • For TCP/IP connectivity, no additional software is required.

Possible Client-to-Server Connectivity Scenarios

The following table shows the communication protocols that can be used when connecting a specific DB2 client to a specific DB2 server. DB2 Workgroup, DB2 Enterprise, and DB2 Enterprise - Extended Editions can service requests from host or AS/400 clients (DRDA ARs).

The following table shows the communication protocols that can be used when connecting a specific DB2 client to a specific DB2 server.

Table 3. Possible Client-to-Server Connectivity Scenarios

Client	Server						
	AIX	HP-UX	Linux	OS/2	PTX/NUMA-Q	Solaris	Windows NT/ Windows 2000
AS/400 V4R1	APPC	N/A	N/A	APPC	N/A	APPC	APPC
AS/400 V4R2	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
AIX	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
HP-UX	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
Linux	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP
MVS	APPC	N/A	N/A	APPC	N/A	APPC	APPC
OS/2	APPC IPX/SPX(1),(2) TCP/IP	TCP/IP	TCP/IP	APPC IPX/SPX(1),(2) NetBIOS TCP/IP	TCP/IP	APPC IPX/SPX(1) TCP/IP	APPC IPX/SPX(1) NetBIOS TCP/IP
OS/390	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
PTX/NUMA-Q	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP
Silicon Graphics IRIX	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP	TCP/IP
SQL/DS	APPC	N/A	N/A	APPC	N/A	APPC	APPC
Solaris	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
VSE & VM V5	APPC	N/A	N/A	APPC	N/A	APPC	APPC
VSE V6	APPC	N/A	N/A	APPC	N/A	APPC	APPC
VM V6	APPC TCP/IP	TCP/IP	TCP/IP	APPC TCP/IP	TCP/IP	APPC TCP/IP	APPC TCP/IP
Windows 9x	TCP/IP	TCP/IP	TCP/IP	NetBIOS TCP/IP	TCP/IP	TCP/IP	IPX/SPX(1) NPIPE NetBIOS TCP/IP
Windows NT/ Windows 2000	APPC IPX/SPX(1) TCP/IP	TCP/IP	TCP/IP	APPC IPX/SPX(1) NetBIOS TCP/IP	TCP/IP	APPC IPX/SPX(1) TCP/IP	APPC IPX/SPX(1) NPIPE NetBIOS TCP/IP
1. Direct Addressing							
2. File Server Addressing							

Migrating from Previous Versions of DB2 Connect

If you are migrating a DB2 product installation on a workstation that is running on a supported Linux distribution, you should be aware that DB2 Version 7 can only run with glibc version 2.1.2 or higher, as mentioned in "Software Requirements" on page 26. If your Linux distribution has a previous version of this library, you will not be able to use your DB2 product.

To prepare your workstation for installation, you have to upgrade your existing Linux distribution to a more recent level that includes the required (or later) version of the *glibc* library; you also have the option to update only the glibc library. We recommend that you update your distribution's

installation to a more recent version that includes the required level for the *glibc* library. Updating only the `glibc` library may cause errors that can impact your operating system

If there are several instances using previous versions of a DB2 product, you do not need to migrate all of these instances at this time. Instances that are not migrated will continue to use the previous version of the DB2 product.

To prepare your instances for migration, you should ensure that you have done the following:
- Stopped any instances that you want to migrate by entering the **db2stop** command.
- Stopped the license daemon by entering the **db2licd –xxx** command.
- Stopped all DB2 back-end processes for any command line processes by entering the **db2 terminate** command in each window.
- Ensured that the db2profile script, located in *INSTHOME*/sqllib/ (where *INSTHOME* is the home directory of the instance owner) is of the proper shell syntax. For example:

```
DB2INSTANCE=db2inst1 //BASH, Bourne, or Korn shell
export DB2INSTANCE
```

or

```
set DB2INSTANCE=db2inst1 //C shell
```

Chapter 3. Security Requirements

Since you will be accessing data managed by other systems, you will require a user ID and password so that you can be authenticated by the system. To obtain these, contact the administrator responsible for the system where the data resides.

In addition, to access the system, you will require authorization to access data objects on the target database server; for example, tables, views, and program packages. To obtain the appropriate authorization, contact your database administrator.

An additional DB2 security mechanism called *binding* allows database administrators to limit access to specific applications. This mechanism is used to build program packages or *plans*. The database administrator then grants authority to users to execute these packages.

If you will be running an application developed using embedded SQL, a package will be supplied with your application. You must bind this package to each database that the application will access. Package files are usually supplied with the `.bnd` file type. CLI/ODBC users do not bind individual applications; instead, they must bind the CLI/ODBC driver itself to each database that will be accessed.

To bind applications or the CLI/ODBC driver, you require the following privileges on each database:

DB2 Universal Database for OS/390

- SYSADM
- SYSCTRL
- BINDADD privilege, plus CREATE IN COLLECTION NULLID

DB2 for VM or VSE
DBA authority

DB2/400   *CHANGE authority or higher on the NULLID collection.

If your database administrator will not grant you these privileges, another user (usually the administrator) must perform the required binds.

Chapter 4. Installing and Configuring DB2 Connect Personal Edition for Linux

This section describes how to install DB2 Connect Personal Edition on a Linux-based workstation. If you want to install a DB2 Administration Client, DB2 Run-Time Client, or a DB2 Application Development Client, refer to the *Installation and Configuration Supplement*. For information on how to deploy this product using a distributed installation, refer to the *Installation and Configuration Supplement*.

If you are migrating a previous installation of a DB2 product, ensure that you have read "Migrating from Previous Versions of DB2 Connect" on page 27.

The instructions in this section cover the following Linux distributions:

1. Red Hat Linux[**]
2. SuSE Linux[**]
3. TurboLinux[**]
4. Caldera Open Linux[**] (or simply Caldera)

For more information on installing other distributions, point your browser to the following web page: www.ibm.com/software/data/db2/linux

We assume in these instructions that you install and configure a DB2 product using the DB2 Installer (**db2setup**) program. The DB2 Installer program is a menu driven installation tool that automates the necessary installation and configuration tasks. You can also install this product manually, however, installing a DB2 product this way requires additional configuration steps after the installation completes.

Before You Begin

Before you begin the installation, you should ensure that your system meets all of the memory, hardware, and software requirements to install your DB2 product. For more information, see "Chapter 2. Planning for Installation" on page 25.

You also need to ensure that your workstation is enabled for a DB2 product installation. Depending on your Linux distribution, you may need to perform certain tasks before installing a DB2 product on your system. The following sections describe what you need to do on your particular Linux distribution.

Installing DB2 Connect on Red Hat Linux

The only preparation work that you need to do to install your DB2 product on a workstation that is running Red Hat Linux Version 6.1 or later is to add the required `pdksh` package that is not part of a Red Hat default installation. This package is available in the `/RedHat/RPMS` directory on the Red Hat CD-ROM. Refer to your Linux documentation for information on how to install this package using the **rpm** command.

Installing DB2 Connect on SuSE Linux

The SuSE Version 6.3 default installation is fairly simple to enable for a DB2 product installation. Any DB2 product on Linux requires `glibc 2.1.2` or higher to run. The SuSE installation comes with this package, however, this distribution refers to this package by a different name. SuSE calls this package `shlibs`. This causes problems because the DB2 Installer program fails to recognize the existence of the required `glibc` package, and ultimately fails. A 'dummy' `glibc` rpm is included on the DB2 CD-ROM. If you install this package, the installation will run smoothly. The package is called `glibc-2.2.1-2.rpm` and is located in the `/db2/install/dummyrpm` directory on the DB2 CD-ROM. Refer to your Linux documentation for information on how to install this package using the **rpm** command.

Installing DB2 Connect on Turbo Linux

To enable your Turbo Linux Version 6.0 or later workstation for a DB2 product installation, you need to add the `pdksh` package. This is the only prerequisite that is missing from a default installation. This package is available on the Turbo Linux CD-ROM and is located in the `/TurboLinux/RPMS` directory. Refer to your Linux documentation for information on how to install this package using the **rpm** command.

Installing DB2 Connect on Caldera Open Linux

Caldera Open Linux Version 2.3 is missing the required `pdksh` package from a default installation. This `pdksh` package is on the Caldera Version 2.3 CD-ROM, however, it currently is not compatible with any DB2 products. Instead, you can use a Red Hat `pdksh` package.

To enable your Caldera workstation for any DB2 product installation using a Red Hat `pdksh` package, download the *pdksh-5.2.13-3.i386* package (or a later version) from the Red Hat mirror web site at: www.redhat.com/download/mirror.html. Because this is a Red Hat package, you will receive a dependency error on the *glibc* package if you try to install it. The *glibc* package is automatically installed with Caldera Version 2.3. You can therefore ignore this error, it is a result of different naming conventions between distribution vendors. To bypass this error, you will have to install this package using the no dependencies option (for example, the **rpm -i --nodeps** command). Refer to your Linux documentation for information on how to install this package using the **rpm** command.

Installation Steps

This section tells you how to install your DB2 product using the DB2 Installer program or manually, using your operating system's native installation tools.

To install DB2 Connect on Linux systems, perform the following steps:

Step 1. Identify and Record Parameter Values

Table 4 will help you determine the values required to install DB2 products and set up a DB2 instance. Before proceeding with the installation and configuration, complete the *Your Value* column in the table. If you want to choose the default value for a parameter, you do not need to provide any value in the *Your Value* column for that parameter. In Table 4, the only parameter for which a value is required is *DB2 Product Name*, which you select after you start the DB2 Installer program. All other parameters either have a default value or are optional.

Table 4. Parameter Values Required for Installation

Information Required for DB2 Installer	Default Value	Your Value
Product/Component		
DB2 Product Name	None	
DB2 Product Messages	None	
Documentation	None	
DB2 Instance		
User Name	db2inst1	
UID	System-generated UID	
Group Name	db2iadm1	
GID	System-generated GID	
Password	ibmdb2	

Step 2. Mount the CD-ROM

To install your DB2 product, you must first mount the CD-ROM. Once you have mounted the CD-ROM, you can start the installation.

To mount the CD-ROM on a Linux workstation, perform the following steps:

Step 1. Log on to the system as a user with root authority.

Step 2. Insert the CD-ROM in the drive and mount it with a command similar to the following:

```
mount -t iso9660 -o ro /dev/cdrom /cdrom
```

where */cdrom* represents the mount point of the CD-ROM.

Step 3. Log out.

Step 3. Install a DB2 Product

This step tells you how to install your DB2 product using the DB2 Installer program, or your operating system's native installation tools.

Installing a DB2 Product Using the DB2 Installer

Sometimes, display problems can occur when running the DB2 Installer program. To refresh the current screen at any time, press **Ctrl+L**. To avoid most potential display problems, install your DB2 product through a virtual console session (a terminal window outside of the graphical interface that most Linux distributions are installed with). To change to a virtual console session, press **Ctrl+Alt+F1**. To change back to the graphical interface, press **Ctrl+Alt+F7** (your particular Linux distribution may differ, refer to your Linux documentation for more information).

When you use the DB2 Installer program, you should be aware of the following:

- The DB2 Installer's **db2setup** command only works with bash, Bourne, and Korn shells. Other shells are not supported.
- You can generate a trace log, *db2setup.trc*, to record errors experienced during the installation. Run the **db2setup** command as follows:

      db2setup -d

  This creates a trace file, `/tmp/db2setup.trc`.

After you mount the CD-ROM, use the DB2 Installer program to install your DB2 product..

To install your DB2 product, perform the following steps:

Step 1. Log on to the system as a user with `root` authority.

Step 2. Change to the directory where the CD-ROM is mounted by entering the following command:

      cd /cdrom

where */cdrom* represents mount point of the CD-ROM.

Step 3. Enter the **./db2setup** command to start the DB2 Installer program. The **Install DB2 V7** window opens.

It will take some time for the DB2 Installer program to start up, as it is scanning your system for information.

```
+ - - - - - - - - - - - - - - - - - - - - - Install DB2 V7 - - - - - - - - - - - - - - - - - - - - - - +
|                                                                                                      |
|                                                                                                      |
|     Select the products you are licensed to install. Your Proof of                                   |
|     Entitlement and License Information booklet identify the products for                             |
|     which you are licensed.                                                                           |
|                                                                                                      |
|     To see the preselected components or customize the selection, select                             |
|     Customize for the product.                                                                        |
|        [   ] DB2 Administration Client                         : Customize. . . :                    |
|        [ * ] DB2 Connect Personal Edition                      [   Customize. . . ]                  |
|        [   ] DB2 Application Development Client                 : Customize. . . :                    |
|                                                                                                      |
|                                                                                                      |
|      To choose a language for the following components, select Customize for                         |
|      the product.                                                                                     |
|        DB2 Product Messages                                    [   Customize. . . ]                  |
|        DB2 Product Library                                     [   Customize. . . ]                  |
|                                                                                                      |
|                                                                                                      |
|                                                                                                      |
|                                                                                                      |
|     [   OK    ]                      [  Cancel  ]                        [  Help   ]                 |
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -+
```

Step 4. From the product list on the *Install DB2 V7* screen, select the products that you want to install.

Press the **Tab** key to change the highlighted option and the **Enter** key to select or deselect an option.

To display the components for a DB2 product that you want to install, select **Customize**. To go back to a previous window at any times, select **Cancel**.

When you have finished selecting the DB2 product and its components, select **OK** to complete the installation.

For more information or assistance during the installation of any DB2 product or component, select **Help**.

> The DB2 Installer program will ask you to specify a username for fenced user defined functions (UDFs) and stored procedures. When installing DB2 Connect Personal Edition, this does not apply; simply accept the default values.

When the installation is complete, Any DB2 software is installed in the /usr/IBMdb2/V7.1 directory. If you are migrating your DB2 product, you may have to perform some tasks to complete the migration process. For more information, see "Chapter 5. DB2 Connect Post-Installation Migration Tasks" on page 41.

> You can use the DB2 Installer program to add additional products or components after your initial installation. To create or add a new instance, an Administration Server, or additional DB2 products and components, enter the following command:
>
> ```
> /usr/IBMdb2/V7.1/install/db2setup
> ```

Manually Installing a DB2 Product

We recommend that you use the DB2 Installer program to install a DB2 product on Linux. The DB2 Installer program is a text-based installation tool that automates the installation and configuration of any DB2 products. If you prefer not to use this utility, you can install a DB2 product manually using the **db2_install** or **rpm** commands. Your DB2 product is made up of different functions and components that are referred to as packages in the Linux environment. When you install your DB2 product using the **rpm** command, you must select to install each package that you require and each associated package for the optional functions that you want to use. Some packages are required and some are optional. For a list of all the required and optional packages for a DB2 product installation, see "Appendix A. Contents of the DB2 Products for Linux" on page 95.

For example, if you want to install the Control Center on your Linux workstation, you would need to install the db2wcc71–7.1.0–0.i386.rpm package by entering the following command:

```
rpm -ivh db2wcc71–7.1.0–0.i386.rpm
```

Using the **rpm** command to install a DB2 product is prone to errors because you could easily skip over a required package. We recommend that you use the **db2_install** script to install a DB2 product if you do not want to use the DB2 Installer program. The **db2_install** script will install both the required and optional packages for a DB2 product using the **rpm** command.

To install a DB2 product using the **db2_install** script:

1. Log in as a user with root authority.
2. Enter the **./db2_install** command. The script will return a list of the products that are available for installation from your CD-ROM, for example:

   ```
   Specify one or more of the following keywords,
   separated by spaces, to install DB2 products.

   DB2.CPER - DB2 Connect Personal Edition
   DB2.SDK  - DB2 Application Development Client
   DB2.CAE  - DB2 Administration Client
   Enter "help" to redisplay the product names, enter "quit" to exit.
   *******************************************************************
   ```

3. Enter the name of the DB2 product that you want to install and press **Enter**. For example, to install DB2 Connect Personal Edition, respond to the **db2_install** script's prompt by entering DB2.CPER. The **db2_install** script will begin installing all the rpms associated with the product that you selected for installation.

When installation is complete your DB2 software will be installed in the /usr/IBMdb2/V7.1 directory.

DB2 Connect Post-Installation Tasks: After manually installing your product, you should create groups and user IDs for the instance owner, Administration Server, and fenced user defined functions (UDFs) and stored procedures. Once you set up these IDs you can create an instance, create the Administration Server, install the license key, and create links for your DB2 product files.

You do not have to perform these tasks if you used the DB2 Installer program to install your DB2 product.

Creating Group and User IDs for the Instance Owner, Administration Server, and UDFs: You should create group and user IDs for the instance owner, Administration Server, and UDFs and stored procedures. If you want to use existing user or group IDs, you can skip this section and proceed to creating an instance.

In addition to the rules imposed by the operating system for user names and groups, you must also adhere to the rules described in "Appendix D. Naming Rules" on page 109.

To create a group and user ID for the instance owner:
1. Log in as a user with root authority.
2. Enter the following command to make a new group:

        groupadd -g 999 dbadmin1

   where 999 represents the group ID and dbadmin1 represents the group name. This new group is the SYSADM group for the instance.
3. Enter the following command to make a new user:

        useradd -u 1004 -g dbadmin1 -m -d /home/db2inst1 db2inst1 -p db2inst1

   where 1004 represents the user ID, dbadmin1 represents the group you created in the previous step, /home/db2inst1 represents the user's home directory, and db2inst1 represents the username and instance name.

You should use a unique user ID for each instance you create. This allows for easier error recovery if a system error occurs.

To create group and user IDs for the Administration Server follow the same steps you used to create IDs for the instance owner. You must use different user IDs for the Administration Server and instance owner. For security reasons, we recommend you use a different group ID for the Administration Server and instance owner.

To create group and user IDs for UDFs and stored procedures, follow the same steps you used to create IDs for the instance owner. For security reasons, we recommend that you use different user IDs for UDFs and the instance owner. You will be asked to supply a UDF user ID when you create a DB2 instance.

Creating an Instance: A DB2 instance is an environment where you store data and run applications. Use the **db2icrt** command to create an instance. You must have root authority to enter this command. For more information about database instances, refer *Administration Guide*.

The **db2icrt** command is run with the following parameters:

```
/usr/IBMdb2/V7.1/instance/db2icrt -a AuthType -u FencedID InstName
```

where:

- `-a AuthType` represents the authentication type for the instance. `AuthType` can be one of `SERVER, CLIENT, DCS, DCE, SERVER_ENCRYPT, DCS_ENCRYPT,` or `DCE_SERVER_ENCRYPT`.
- `-u FencedID` represents the name of the user under which fenced user defined functions (UDFs) and fenced stored procedures will run. This flag is not required if you are creating an instance on a DB2 client.
- `InstName` represents the name of instance.

You must configure each instance to accept inbound communications. For more information, refer to the *Installation and Configuration Supplement*.

Creating the Administration Server: The Administration Server provides services to support tools that automate the configuration of connections to DB2 databases. The Administration Server also supports tools that administer DB2 from your server system or a remote client using the Command Center.

To create the Administration Server, use the **/usr/IBMdb2/V7.1/instance/dasicrt ASName** command, where *ASName* represents the name of the Administration Server you want to create. For more information on the Administration Server, refer to the *Administration Guide*.

After you have created the Administration Server, you must configure it to accept inbound connections. For more information, refer to the *Installation and Configuration Supplement*.

Updating the License Key: Your Proof of Entitlement and the *License Information* booklet identify the products for which you are licensed.

To update your DB2 product's license key:
1. Log in as a user with root authority.
2. Update your DB2 product's license with the following command:

    ```
    /usr/IBMdb2/V7.1/adm/db2licm -a filename
    ```

    where `filename` is the full pathname and filename for the license file that corresponds to the product you have purchased.

    The name of the license file for this product is:

    db2conpe.lic
    > DB2 Connect Personal Edition

    For example, if the CD-ROM is mounted on `/cdrom` and the name of the license file is `db2conpe.lic`, the command should be entered as follows:

    ```
    /usr/IBMdb2/V7.1/adm/db2licm -a /cdrom/db2/license/db2conpe.lic
    ```

Creating Links for DB2 Files: To create links in the `/usr/lib` and the `/usr/include` directories to DB2 files, log in as a user with root authority and run the **/usr/IBMdb2/V7.1/cfg/db2ln** command.

If there are existing links to the `/usr/lib` and `/usr/include` directories from previous versions of a DB2 product, they will automatically be removed by entering the **db2ln** command to create links for this version. If you want to re-establish the links to the libraries of previous versions of your DB2 product, then you must execute the **db2rmln** command from your previous version of your DB2 product *before* you execute the **db2ln** command on previous version of your DB2 product. Links can be established for only one version of a DB2 product on a given system.

If you are migrating from a previous version of a DB2 product, you now need to migrate any instances that you want to use with this version of the DB2 product that you installed. For more information, see "Chapter 5. DB2 Connect Post-Installation Migration Tasks" on page 41.

Chapter 5. DB2 Connect Post-Installation Migration Tasks

After the installation completes, you should migrate your instances by running the **db2imigr** command. The **db2imigr** command checks that your instances can be migrated and then performs the actual migration to the Version 7 format.

To migrate instances, including the Administration Server instance, to a format useable by DB2 Version 7, you must run the **db2imigr** command by performing the following steps:

1. Log in as user with root authority.
2. Enter the **db2imigr** command as follows:

   `/usr/IBMdb2/V7.1/instance/db2imigr [-d] [-a AuthType] [-u fencedID] InstName`

   where:

   -d   Sets the debug mode that you can use for problem determination. This parameter is optional.

   -a *AuthType*
        Specifies the authentication type for the instance. Valid authentication types are SERVER, CLIENT, and DCS. If the *-a* parameter is not specified, the authentication type defaults to SERVER. This parameter is optional. The authentication type of an instance applies to all databases owned by the instance.

   > **Note:** Although authentication type DCE is a valid authentication type for an instance, you cannot specify this type of authentication using this command. For more information, refer to the *Administration Guide*.

   -u *fencedID*
        Is the user under which the fenced user-defined functions (UDFs) and stored procedures will execute. This parameter is required.

   InstName
        Is the login name of the instance owner.

Once you have migrated all of your instances to the Version 7 format, you are finished the migration process.

Part 3. Preparing Host and AS/400 Databases for DB2 Connect Communications

Chapter 6. Configuring Host and AS/400 Databases for DB2 Connect

This section describes the steps required to configure host and AS/400 database servers to accept connections from DB2 Connect workstations. These steps must be performed by users who have the necessary system privileges and special expertise, such as your network or system administrator and your DB2 administrator.

For more information on configuring host and AS/400 database servers, refer to the following publications:

- The *DB2 for OS/390 Installation Guide* (GC26-8970) contains the most complete and up-to-date information for DB2 Universal Database for OS/390.
- The online *Connectivity Supplement* provided with DB2 Connect contains selected information on setting up a host or AS/400 database server communications.
- *Distributed Relational Database Cross Platform Connectivity and Applications* (SG24-4311) contains useful post-configuration information.

The sample values used in this section match those used elsewhere in this book. When you follow the instructions provided you *must* substitute your own values.

Go to the section that describes the type of system that you want to configure to accept connections from DB2 Connect workstations:

- To configure OS/390 systems for DB2 Connect, see "Preparing OS/390 for DB2 Connect".
- To configure AS/400 systems for DB2 Connect, refer to the *Connectivity Supplement*.
- To configure VM systems for DB2 Connect, refer to the *Connectivity Supplement*.

Preparing OS/390 for DB2 Connect

Your VTAM administrator and your host system administrator must configure VTAM and OS/390 to receive inbound connection requests from your DB2 Connect workstation. Usually your host system has already been configured for communications. For more information, contact your VTAM administrator and your host system administrator or refer to the *Connectivity Supplement*.

> This section assumes that your DB2 for OS/390 server has already been configured for remote client access, if this is not the case, refer to the *Connectivity Supplement* for the required VTAM configuration steps.

Verify that the Correct PTFs Have Been Applied to your OS/390 SystemDB2 Universal Database for OS/390

Before you configure you OS/390 system to accept inbound requests for data from your DB2 Connect Personal edition workstation, you muse verify that the following PTFs have been applied:

- PTF UQ06843 for APAR PQ05771
- PTF UQ09146 for APAR PQ07537.

Configure DB2 Universal Database for OS/390

Before you can use DB2 Connect, your DB2 Universal Database for OS/390 Administrator must configure DB2 Universal Database for OS/390 to permit connections from DB2 Connect workstations. This section indicates the *minimum* updates required in order to permit a DB2 Connect client to make a connection to the DB2 Universal Database for OS/390 database server. For more detailed examples, refer to the *Connectivity Supplement*, and the *DB2 for OS/390 Installation Reference*.

Configure TCP/IP for DB2 Universal Database for OS/390

This section describes how to configure TCP/IP communications between your DB2 Connect workstation and DB2 Universal Database for OS/390 Version 5.1 or later. It assumes that:

- You are connecting to a single host database via TCP/IP. Multiple host connections will be handled in exactly the same way, although the *port number* and *service number* required in each case may be different.
- The target database resides on DB2 Universal Database for OS/390 Version 5.1 or later.
- All the necessary software prerequisites are installed.

Prerequisite OS/390 Software for TCP/IP Support

OS/390 R3+ is the minimum operating system level required for TCP/IP support. OS/390 V2R5+ is the recommended operating system level, and the best performer.

The following informational APARS for DB2 for OS/390 are regularly updated with information about PTFs to install for various OS/390 components, particularly TCP/IP for OS/390. If you use TCP/IP connectivity with DB2 for OS/390, it is extremely important that you review and apply the following PTFs and APAR fixes:

- II11164

- II11263
- II10962
- DB2 for OS/390 Version 5.1: PTF UQ13908, PTF UQ17755

Collecting Information

Before you can use DB2 Connect over a TCP/IP connection, you must collect information about both the host database server and the DB2 Connect workstation. For each host server that you are connecting to via TCP/IP, you must have the following information:

- The locations of the equivalent files at the target DB2 Universal Database for OS/390 host.
- The TCP/IP *port number* defined to DB2 Universal Database for OS/390. (Note that the associated *service name* information is not exchanged between the DB2 Connect workstation and DB2 Universal Database for OS/390). Port number 446 has been registered as the default for communication from a DB2 Connect workstation.
- The TCP/IP addresses and hostnames for both the host and the DB2 Connect workstation.
- The LOCATION NAME of the DB2 for OS/390 database server
- The user ID and password to be used when issuing *CONNECT* requests for the database at the host.

Refer to your local network administrator and your DB2 for OS/390 administrator for help getting this information. Use one copy of the example work sheet, Table 5, to plan *each* TCP/IP connection between DB2 Connect and a host database server.

Example Worksheet:

Table 5. Example Worksheet for Planning TCP/IP Connections to DB2 Universal Database for OS/390

Ref.	Description	Sample Value	Your Value
User Information			
`TCP-1`	User Name	A.D.B.User	
`TCP-2`	Contact Info	(123)-456-7890	
`TCP-5`	User ID	ADBUSER	
`TCP-6`	Database Type	db2390	
`TCP-7`	Connection type (must be TCPIP).	TCPIP	TCPIP

Table 5. Example Worksheet for Planning TCP/IP Connections to DB2 Universal Database for OS/390 (continued)

Ref.	Description	Sample Value	Your Value
Network Elements at the Host			
`TCP-8`	Host name	nyx	
`TCP-9`	Host IP address	9.21.15.235	
`TCP-10`	Service name	db2inst1c	
`TCP-11`	Port number	446	
`TCP-12`	LOCATION NAME	newyork	
`TCP-13`	User ID		
`TCP-14`	Password		
Network Elements at the DB2 Connect Workstation			
`TCP-18`	Host name	mcook02	
`TCP-19`	IP address	9.21.27.179	
`TCP-20`	Service name	db2inst1c	
`TCP-21`	Port number	446	

Notes:

1. To obtain the host's IP address `TCP-9`, enter at the host:

   TSO NETSTAT HOME

2. To obtain the port number `TCP-11`, look for DSNL004I in the DB2 master address space or system log.

Configuring the TCP/IP Connection

Use the manual steps in this section to complete the configuration and make the connection.

1. Complete the Worksheet: Complete a copy of the example worksheet for each TCP/IP host:

1. Fill in the values to be used for the TCP/IP address and hostname of the DB2 Universal Database for OS/390 host (items 8 and 9).
2. Fill in the values to be used for the TCP/IP address and hostname of the DB2 Connect workstation (items 18 and 19).
3. Determine the *port number* or *service name* to be used for the connection (items 10 and 11, or 20 and 21).
4. Determine the LOCATION NAME of the DB2 for OS/390 database server to which you wish to connect.
5. Determine the values to be used for *user ID* and *PASSWORD* when connecting to the host database.

Note that some additional planning considerations may apply, refer to the *DB2 Connect User's Guide* for more information.

2. Update the DB2 Universal Database for OS/390 Host: At your OS/390 host:

1. Verify the *host address* or the *host name*.
2. Verify the *port number* or the *service name*.
3. Update the `services` file with the correct port number and service name if necessary.
4. Update the `hosts` file (or the Domain Name Server used by the DB2 Universal Database for OS/390 system) with the hostname and IP address of the DB2 Connect workstation.
5. Ensure the new definitions are active before attempting to test the connection. Refer to your host network administrator or change control staff if necessary.
6. Check with the DB2 Universal Database for OS/390 administrator that you have a valid user ID, password, and database *LOCATION NAME*.
7. *PING* the DB2 Connect workstation, using the correct port number if that option is supported by TCP/IP on the host system. For example:

    ```
    ping remote_host_name -p port_number
    ```

Part 4. Configuring DB2 Connect to Communicate with Host and AS/400 Databases

Chapter 7. Configuring Communications to Host or AS/400–Based Servers Using the Command Line Processor

This section assumes that TCP/IP is functional on the DB2 Connect workstation and the host or AS/400 system where the DB2 data resides. See "Software Requirements" on page 26 for the communication protocol requirements for your platform.

To set up TCP/IP communications between your DB2 Connect workstation and a host or AS/400 DB2 server, perform the following steps:

Step 1. Identify and record parameter values.

Step 2. Configure the DB2 Connect workstation:

      a. Resolve the host's IP address.

      b. Update the `services` file.

Step 3. Catalog the TCP/IP node.

Step 4. Catalog the database.

Step 5. Catalog the database as a Database Connection Service (DCS) database.

Step 6. Bind utilities and applications to the database server.

Step 7. Update the DB2 Connect configuration.

Step 8. Test the host or AS/400 connection.

> Due to the characteristics of the TCP/IP protocol, TCP/IP may not be immediately notified of the failure of a partner on another host. As a result, a client application accessing a remote DB2 server using TCP/IP, or the corresponding agent at the server, may sometimes appear to be hung. DB2 uses the TCP/IP SO_KEEPALIVE socket option to detect when there has been a failure and the TCP/IP connection has been broken.
>
> If you are experiencing problems with your TCP/IP connection, refer to the *Troubleshooting Guide* for information on how to adjust this parameter and other common TCP/IP problems.

Step 1. Identify and Record Parameter Values

As you proceed through the configuration steps, complete the *Your Value* column in the following table. You can fill in some of the values before you start configuring this protocol.

Table 6. TCP/IP Values Required at the DB2 Connect Workstation

Parameter	Description	Sample Value	Your Value
Host Name • Hostname (*hostname*) or • IP address (*ip_address*)	Use the *hostname* or *ip_address* of the remote host. To resolve this parameter: • Contact your network administrator to obtain the *hostname*. • Contact your network administrator to obtain the *ip_address* or enter the **ping** *hostname* command.	nyx or 9.21.15.235	

Table 6. TCP/IP Values Required at the DB2 Connect Workstation (continued)

Parameter	Description	Sample Value	Your Value

Service Name
• Connection Service name (*svcename*) or
• Port number/Protocol (*port_number/tcp*)
	Values required in the `services` file.
	
	The Connection Service name is an arbitrary name that represents the Connection port number (*port_number*) on the client.
	
	The port number for the DB2 Connect workstation must be the same as the port number that the *svcename* parameter maps to in the `services` file at the host database server. (The *svcename* parameter is located in the database manager configuration file on the host.) This value must not be in use by any other applications, and must be unique within the `services` file.
	
	This value generally must be 1024 or higher.
	
	Contact your database administrator for the values used to configure the host system.
		`host1`
		
		or
		
		`446/tcp`	

Target database name (*target_dbname*)	The database name as it is known on the host or AS/400 system. • If you are connecting to a DB2 for OS/390 system, use the `location` name. • If you are connecting to a DB2 for AS/400 system, use the `local RDB` name. • If you are connecting a DB2 for VM, use the `dbname`.	`newyork`	

Table 6. TCP/IP Values Required at the DB2 Connect Workstation (continued)

Parameter	Description	Sample Value	Your Value
Local database name (*local_dcsname*)	An arbitrary local nickname for use by DB2 Connect that represents the remote host or AS/400 database.	ny	
Node name (*node_name*)	A local alias, or nickname, that describes the node to which you are trying to connect. You can choose any name you want; however, all node name values within your local node directory must be unique.	db2node	

Step 2. Configure the DB2 Connect Workstation

The following steps configure this protocol on the DB2 Connect Workstation. Replace the sample values with your worksheet values.

A. Resolve the Host's IP Address

If your network has a name server, or you are planning to directly specify the IP address (*ip_address*) of the server, skip this step and proceed to "B. Update the Services File" on page 57.

The DB2 Connect workstation must know the address of the host system to which it is attempting to establish communications. If a name server does not exist on your network, you may directly specify a hostname that maps to the IP address (*ip_address*) of the host system in the local hosts file. On your Linux system, the hosts file is located in the /etc directory.

If you are planning on supporting a UNIX client that is using Network Information Services (NIS), and you are not using a domain name server on your network, you must update the hosts file located on your NIS master server.

Using a text editor, add an entry to the DB2 Connect workstation's hosts file for the host system's hostname. For example:

```
9.21.15.235    nyx  # host address for nyx
```

where:

9.21.15.235
>   represents the *ip_address*

nyx   represents the *hostname*

\#   represents a comment describing the entry

> If the host system is not in the same domain as the DB2 Connect
> Workstation, you must provide a fully qualified domain name such
> as `nyx.spifnet.ibm.com`, where `spifnet.ibm.com` is the domain
> name.

B. Update the Services File

> If you are planning to catalog a TCP/IP node using a port number
> (*port_number*), skip this step and go to "Step 3. Catalog the TCP/IP
> Node" on page 58.

Using a text editor, add the Connection Service name and port number to the
DB2 Connect workstation's `services` file. This file is located in the same
directory as the local `hosts` file that you may have edited in "A. Resolve the
Host's IP Address" on page 56. On your Linux system, the `services` file is
located in the `/etc` directory. For example:

```
host1  446/tcp  # DB2 connection service port
```

where:

host1   represents the Connection Service name

446   represents the Connection port number

tcp   represents the communication protocol that you are using

\#   represents a comment describing the entry

The port number used on the DB2 Connect workstation must match the port
number used on the host system. Also, ensure that you did not specify a port
number that is being used by any other process.

> If you are planning on supporting a UNIX client that uses Network
> Information Services (NIS), you must update the `services` file
> located on your NIS master server.

Step 3. Catalog the TCP/IP Node

You must add an entry to the DB2 Connect workstation's node directory to describe the remote node. This entry specifies the chosen alias (*node_name*), the *hostname* (or *ip_address*), and the *svcename* (or *port_number*) that the client will use to access the remote host.

To catalog a TCP/IP node, perform the following steps:

Step 1. Log on to the system as a user with System Administrative (SYSADM) or System Controller (SYSCTRL) authority.

Step 2. Set up the instance environment and invoke the DB2 command line processor. Run the start-up script as follows:

```
. INSTHOME/sqllib/db2profile    (for Bourne or Korn shell)
source INSTHOME/sqllib/db2cshrc (for C shell)
```

where *INSTHOME* is the home directory of the instance.

Step 3. Catalog the node by entering the following commands:

```
db2 catalog tcpip node node_name remote [hostname|ip_address]
    server [svcename|port_number]
db2 terminate
```

For example, to catalog the remote host *nyx* on the node called *db2node*, using the service name *host1*, enter the following:

```
db2 catalog tcpip node db2node remote nyx server host1
db2 terminate
```

To catalog a remote server with the IP address *9.21.15.235* on the node called *db2node*, using the port number *446*, enter the following:

```
db2 catalog tcpip node db2node remote 9.21.15.235 server 446
db2 terminate
```

> If you need to change values that were set with the **catalog node** command, perform the following steps:
>
> Step 1. Run the **uncatalog node** command in the command line processor as follows:
>
> ```
> db2 uncatalog node node_name
> ```
>
> Step 2. Recatalog the node with the values that you want to use.

Step 4. Catalog the Database as a Database Connection Service (DCS) Database

To catalog the remote database as a Data Connection Services (DCS) database, perform the following steps:

Step 1. Log on to the system as a user with System Administrative (SYSADM) or System Controller (SYSCTRL) authority.

Step 2. Enter the following commands:

```
catalog dcs db local_dcsname as target_dbname
terminate
```

where:
- *local_dcsname* is the local name of the host or AS/400 database.
- *target_dbname* is the name of database on the host or AS/400 database system.

For example, to make *ny* the local database name for DB2 Connect, for the remote host or AS/400 database called *newyork*, enter the following commands:

```
catalog dcs db ny as newyork
terminate
```

Step 5. Catalog the Database

Before a client application can access a remote database, the database must be cataloged on the host system node and on any DB2 Connect workstation nodes that will connect to it. When you create a database, it is automatically cataloged on the host with the database alias (*database_alias*) the same as the database name (*database_name*). The information in the database directory, along with the information in the node directory, is used on the DB2 Connect workstation to establish a connection to the remote database.

To catalog a database on the DB2 Connect Workstation, perform the following steps.

Step 1. Log on to the system as a user with System Administrative (SYSADM) or System Controller (SYSCTRL) authority.

Step 2. Fill in the *Your Value* column in the following worksheet.

Table 7. Worksheet: Parameter Values for Cataloging Databases

Parameter	Description	Sample Value	Your Value
Database name (*database_name*)	The local DCS database name (*local_dcsname*) of the *remote* database. You specified this when you catalogued the DCS database directory. For example, *ny*.	ny	

Table 7. Worksheet: Parameter Values for Cataloging Databases (continued)

Parameter	Description	Sample Value	Your Value
Database alias (*database_alias*)	An arbitrary local nickname for the remote database. If you do not provide one, the default is the same as the database name (*database_name*). This is the name that you use when connecting to the database from a client.	`localny`	
Node name (*node_name*)	The name of the node directory entry that describes where the database resides. Use the same value for node name (*node_name*) that you used to catalog the node in the previous step.	`db2node`	

Step 3. Set up the instance environment and invoke the DB2 command line processor. Run the start-up script as follows:

```
. INSTHOME/sqllib/db2profile    (for Bourne or Korn shell)
source INSTHOME/sqllib/db2cshrc (for C shell)
```

where *INSTHOME* is the home directory of the instance.

Step 4. Catalog the database by entering the following commands in the command line processor:

```
db2 catalog database database_name as database_alias at node node_name
db2 terminate
```

For example, to catalog the DCS known database *ny* so that it has the local database alias *localny*, on the node *db2node*, enter the following commands:

```
db2 catalog database ny as localny at node db2node
db2 terminate
```

> If you need to change values that were set with the **catalog** *database* command, perform the following steps:
>
> Step a. Run the **uncatalog** *database* command in the command line processor as follows:
>
> ```
> db2 uncatalog database database_alias
> ```
>
> Step b. Recatalog the database with the value that you want to use.

Step 6. Bind Utilities and Applications to the Database Server

The steps you have just completed set up the DB2 Connect workstation to communicate with the host or AS/400 system. You must now bind the utilities and applications to the host or AS/400 database server.

To bind the utilities and applications to the host or AS/400 database server, enter the following commands:

```
db2 connect to dbalias user userid using password
db2 "bind path@ddcsmvs.lst blocking all sqlerror continue
    messages mvs.msg grant public"
db2 connect reset
db2 terminate
```

For example:

```
db2 connect to localny user myuserid using mypassword
db2 "bind /sqllib/myapps@ddcsmvs.lst blocking all sqlerror continue
    messages mvs.msg grant public"
db2 connect reset
db2 terminate
```

> The *userid* and *password* specified must have the authority to bind applications against the target database.

For more information about these commands, refer to the *DB2 Connect User's Guide*.

Step 7. Update the DB2 Connect Configuration

> If you are not planning to use applications that employ multisite updates, skip this step and go to "Step 6. Bind Utilities and Applications to the Database Server".

If multisite update (two phase commit) applications will be used at this workstation, you will need to provide information regarding the required DB2 Transaction Manager Database (for example, the TM_DATABASE). This assigned database will be used by DB2 to store information about inflight transactions.

At a command line prompt, enter the following command to update the Database Manager Configuration:

```
db2 update dbm config using TM_DATABASE 1st_conn
```

where *TM_DATABASE* can have one of the following settings:

- *1ST_CONN*, the first database that a connection is established to will be used as the Transaction Manager database for transactions. If this option is used, then the first database connected to must be either a DB2 Universal Database Version 5 or later database, or a DB2 Universal Database for OS/390 Version 5.1 or later database. This is the recommended setting, and it is the default value for *TM_DATABASE*.
- *database_name*, the named database that is connected to will be used. If this option is used, we recommend that the named database should be either a DB2 Universal Database version 5 or later database, or a DB2 Universal Database for OS/390 Version 5.1 or later database.

Step 8. Test the Host or AS/400 Connection

When you have finished configuring the DB2 Connect workstation for communications, perform the following steps to test the connection:

> You will need to connect to a remote database to test the connection.

Step 1. Start the database manager by entering the **db2start** command on the host database server (if it was not already started).

Step 2. Enter the following command in the DB2 Connect workstation's Command Center or command line processor to connect to the remote database:

```
connect to database_alias user userid using password
```

The values for *userid* and *password* must be valid for the system on which they are authenticated. By default, authentication takes place on the host or AS/400 database server.

Authentication for connecting to host databases is set while configuring DB2 Connect. For more information, refer to the *DB2 Connect User's Guide*.

If the connection is successful, you will get a message showing the name of the database to which you have connected. You are now able to retrieve data from that database. For example, to retrieve a list of all the table names listed in the system catalog table, enter the following SQL command in the Command Center or command line processor:

```
"select tabname from syscat.tables"
```

When you are finished using the database connection, enter the **connect reset** command to end the database connection.

> You are now ready to start using DB2. For more advanced topics, refer to the *Administration Guide* and the *Installation and Configuration Supplement*.

Test the Host Connection

If the connection fails, check the following items:

At the *host*:

__ 1. The *db2comm* registry value includes the value `tcpip`.

__ 2. The `services` file was updated correctly.

__ 3. The service name (*svcename*) parameter was updated correctly in the database manager configuration file.

__ 4. The database was created and cataloged properly.

__ 5. The database manager was stopped and started again (enter the **db2stop** and **db2start** commands on the server).

__ 6. The port number specified is not being used by any other process.

> If there are problems starting a protocol's connection managers, a warning message appears and the error messages are logged in the `db2diag.log` file.
>
> For more information on the `db2diag.log` file, refer to the *Troubleshooting Guide*.

At the *DB2 Connect workstation*:

__ 1. If used, the `services` and `hosts` files were updated correctly.

__ 2. The node was cataloged with the correct hostname (*hostname*) or IP address (*ip_address)*.

__ 3. The port number must match, or the service name must map to, the port number used on the host.

__ 4. The node name (*node_name*) that was specified in the database directory points to the correct entry in the node directory.

__ 5. The database was cataloged properly, using the *hosts's* database alias (*database_alias*) that was cataloged when the database was created on the host, as the database name (*database_name*) on the DB2 Connect workstation.

If the connection still fails after you verify these items, refer to the *Troubleshooting Guide*.

Chapter 8. Enabling Multisite Updates (Two-Phase Commit)

This section provides an overview of the multisite update function as it applies to scenarios that involve host and AS/400 database servers. It describes the products and components needed to implement PC, UNIX, and Web applications that update multiple DB2 databases in the same transaction.

Multisite update, also known as distributed unit of work (DUOW) and two-phase commit, is a function that enables your applications to update data in multiple remote database servers with guaranteed integrity. For example, a banking transaction that involves the transfer of money from one account to another in a different database server.

In such a transaction, it is critical that updates which implement debit operations on one account do not get committed unless updates required to process credits to the other account are committed as well. The multisite update considerations apply when data representing these accounts is managed by two different database servers.

DB2 products provide comprehensive support for multisite updates. This support is available for applications developed using regular SQL as well as applications that use transaction monitor (TP monitor) products that implement the X/Open XA interface specification. Examples of such TP monitors products include IBM TxSeries (CICS and Encina), IBM Message and Queuing Series, IBM Component Broker Series, IBM San Francisco Project as well as Microsoft Transaction Server (MTS), BEA Tuxedo and several others. There are different setup requirements depending on whether native SQL multisite update or TP monitor multisite update is used.

Both the native SQL and TP monitor multisite update programs must be precompiled with the CONNECT 2 SYNCPOINT TWOPHASE options. Both can use the SQL Connect statement to indicate which database they want to be used for the SQL statements that follow. If there is no TP monitor to tell DB2 it is going to coordinate the transaction (as indicated by DB2 receiving the xa_open calls from the TP monitor to establish a database connection), then the DB2 software will be used to coordinate the transaction.

When using TP monitor multisite update, the application must request commit or rollback by using the TP monitor's API.

When using native SQL multisite update, the normal SQL COMMIT and ROLLBACK must be used.

TP monitor multisite update can coordinate a transaction that accesses both DB2 and non-DB2 resource managers such as Oracle, Informix or SQLServer. Native SQL multisite update is used with DB2 servers only.

For a multisite update transaction to work, each of the databases participating in a distributed transaction must be capable of supporting distributed unit of work. Currently, the following DB2 servers provided DUOW support that enabled them to participate in distributed transactions:

- DB2 UDB for UNIX, OS/2, and Windows V5 or later
- DB2 for MVS/ESA V3.1 and 4.1
- DB2 for OS/390 V5.1
- DB2 Universal Database for OS/390 V6.1 or later
- DB2/400 V3.1 or later (SNA only)
- DB2 Server for VM and VSE V5.1 or later (SNA only)
- Database Server 4

A distributed transaction can update any mix of supported database servers. For example, your application can update several tables in DB2 Universal Database on Windows NT or Windows 2000, a DB2 for OS/390 database, and a DB2/400 database, all within a single transaction.

Host and AS/400 Multisite Update Scenarios that Require SPM

Host and AS/400 database servers require DB2 Connect to participate in a distributed transaction originating from PC, UNIX, and Web applications. In addition, many of the multisite update scenarios that involve host and AS/400 database servers require that the Syncpoint Manager (SPM) component be configured. When a DB2 instance is created, the DB2 SPM is automatically configured with default settings.

The need for SPM is dictated by the choice of protocol (SNA or TCP/IP) and use of a TP monitor. The following table provides a summary of scenarios that require the use of SPM. The table also shows that DB2 Connect is required for any access to the host or AS/400 from Intel or UNIX machines. In addition, for multisite updates, the SPM component of DB2 Connect is required if the access is via SNA or uses a TP monitor.

Table 8. Host and AS/400 multisite update scenarios that require SPM

TP Monitor Used?	Protocol	SPM Needed?	Product Required (choose One)	Host and AS/400 Database Supported
Yes	TCP/IP	Yes	• DB2 Connect Enterprise Edition • DB2 Universal Database Enterprise Edition • DB2 Universal Database Enterprise - Extended Edition	• DB2 for OS/390 V5.1 • DB2 Universal Database for OS/390 V6.1 or later
Yes	SNA	Yes	• DB2 Connect Enterprise Edition* • DB2 Universal Database Enterprise Edition* • DB2 Universal Database Enterprise - Extended Edition* **Note:** *AIX, OS/2, Windows NT and Windows 2000 platforms only.	• DB2 for MVS/ESA V3.1 and 4.1 • DB2 for OS/390 V5.1 • DB2 Universal Database for OS/390 V6.1 or later • DB2/400 V3.1 or later • DB2 Server for VM or VSE V5.1 or later

Table 8. Host and AS/400 multisite update scenarios that require SPM (continued)

TP Monitor Used?	Protocol	SPM Needed?	Product Required (choose One)	Host and AS/400 Database Supported
No	TCP/IP	No	- DB2 Connect Personal Edition - DB2 Connect Enterprise Edition - DB2 Universal Database Enterprise Edition - DB2 Universal Database Enterprise - Extended Edition	- DB2 for OS/390 V5.1 - DB2 Universal Database for OS/390 V6.1 or later
No	SNA	Yes	- DB2 Connect Enterprise Edition* - DB2 Universal Database Enterprise Edition* - DB2 Universal Database Enterprise - Extended Edition*	- DB2 for MVS/ESA V3.1 and 4.1 - DB2 for OS/390 V5.1 - DB2 Universal Database for OS/390 V6.1 or later - DB2/400 V3.1 or later - DB2 Server for VM and VSE V5.1 or later

Note: A distributed transaction can update any mix of supported database servers. For example, your application can update several tables in DB2 UDB on Windows NT, a DB2 for OS/390 database and a DB2/400 database all within a single transaction.

For more information about two-phase commit, as well as instructions for setting up for several popular TP monitors, refer to the *Administration Guide*.

You can also access the DB2 Product and Service Technical Library on the World Wide Web:

1. Go to the following Web page:
   http://www.ibm.com/software/data/db2/library/
2. Select the **DB2 Universal Database** link.
3. Search for ″Technotes″ using the search keywords ″DDCS″, ″SPM″, ″MTS″, ″CICS″, and ″ENCINA″.

Using the Control Center to Enable Multisite Updates

You can use the Control Center to provide multisite updates. The procedure is simple, and is outlined below. For more information about the multisite update configuration process, including how to configure your system manually, refer to the online *Connectivity Supplement*.

Starting the Multisite Update Wizard

From the Control Center, click the [+] sign to expand the tree view. With the right mouse button, select the instance that you wish to configure. A pop-up menu opens. Select **Multisite Update —> Configure** menu item.

Wizard Steps

The Wizard provides a notebook-type interface. Each page of the wizard will prompt you for certain information about your configuration. The pages are shown below in the order in which you will encounter them.

Step 1. Specify a Transaction Processor (TP) monitor.

This field will show the defaults for the TP monitor you have enabled. If you do not want to use a TP monitor, select **Do Not Use a TP Monitor**.

Step 2. Specify the communications protocols you will use.

Step 3. Specify a Transaction Manager database.

This panel defaults to the first database you connect to (1ST_CONN). You can leave this default or select another catalogued database.

Step 4. Specify the types of database servers involved in the update, and also whether or not TCP/IP is to be used exclusively.

Step 5. Specify the Syncpoint Manager settings.

This page will only appear if the settings on the previous page indicate that you need to use DB2's Syncpoint Manager in a multisite update scenario.

Testing the Multisite Update Feature

Step 1. Select the instance with the right mouse button and choose the **Multisite Update —> Test** menu option from the pop-up menu. The Test Multisite Update window opens.

Step 2. Select the databases you want to test from the available databases in the **Available databases** list box. You can use the arrow buttons in the middle to move selections to and from the **Selected databases** list box. You can also change the selected userid and password by directly editing them in the **Selected databases** list box.

Step 3. When you have finished your selection, click **OK** at the bottom of the window. The Multisite Update Test Result window opens.

Step 4. The Multisite Update Test Result window shows which of the databases you selected succeeded or failed the update test. The window will show SQL codes and error messages for those that failed.

Part 5. Using DB2 Connect

This section provides an overview of the tools available for using DB2 databases with DB2 clients and application software. The topics covered include ODBC/JDBC access, CLI support, Net.Data macro basics for web software and the Application Development Client.

Who should read this section:

- Software developers who want to make their applications DB2–aware
- Web designers integrating DB2 Connect with CGI applications or Net.Data

Chapter 9. Running Your Own Applications

Various types of applications can access DB2 databases:

- Applications developed using the DB2 Application Development Client that include embedded SQL, APIs, stored procedures, user-defined functions or calls to the DB2 CLI.
- ODBC applications such as Lotus Approach.
- Java applications and applets (JDBC and SQLJ).
- Net.Data macros containing HTML and SQL.

An application on a DB2 client can access a remote database without knowing its physical location. The DB2 client determines the location of the database, manages the transmission of the requests to the database server, and returns the results.

In general, to run a database client application, perform the following steps:

Step 1. Ensure the server is configured and running.

Be sure that the database manager is started on the database server to which the application program is connecting. If it is not, you must issue the **db2start** command at the server before starting the application.

Step 2. Ensure that you can connect to the database that the application uses.

Step 3. Bind the utilities and the applications to the database. See "Binding Database Utilities" for information about binding the utilities.

Step 4. Run the application program.

Binding Database Utilities

You must bind the database utilities (import, export, reorg, the command line processor) and DB2 CLI bind files to each database before they can be used with that database. In a network environment, if you are using multiple clients that run on different operating systems or are at different versions or service levels of DB2, you must bind the utilities once for each operating system and DB2-version combination.

Binding a utility creates a *package*, which is an object that includes all of the information that is needed to process specific SQL statements from a single source file.

The bind files are grouped together in different `.lst` files in the `bnd` directory, under the installation directory. Each file is specific to a server.

Binding to Host Databases

To bind the utilities and applications to the DRDA server, connect to the DRDA server and use commands similar to the following:

```
connect to dbalias user userid using password
bind path/bnd/@ddcsmvs.lst blocking all sqlerror continue
        messages mvs.msg grant public
connect reset
```

where *path* corresponds to the *DB2PATH* registry value. These commands are described in detail in the *DB2 Connect User's Guide*.

Binding to DB2 Universal Databases

On a Linux workstation, you bind the database utilities to a database using the command line processor. To bind database utilities, perform the following steps:

Step 1. Change to the *INSTHOME*/sqllib/bnd directory, where *INSTHOME* is the home directory of the instance owner.

Step 2. Connect to the database by entering the following command:

```
db2 connect to database_alias
```

where *database_alias* is the name of the database that you want to connect to.

Step 3. Enter the following commands to bind the database utilities:

```
db2 "bind @db2ubind.lst messages bind.msg grant public"
db2 "bind @db2cli.lst messages clibind.msg grant public"
```

In this example, `bind.msg` and `clibind.msg` are the output message files, EXECUTE and BINDADD privileges are granted to *public*.

Step 4. Reset the database connection by entering the following command:

```
db2 connect reset
```

For more information on the **bin** command, refer to the *Command Reference*.

Notes:

1. The `db2ubind.lst` file contains the list of bind (.bnd) files required to create packages for the database utilities. The `db2cli.lst` file contains the list of bind (.bnd) files required to create packages for the DB2 CLI and DB2 ODBC driver.

2. Binding may take a few minutes to complete.

Running CLI/ODBC Programs

The DB2 Call Level Interface/ODBC driver (which consists of the DB2 Call Level Interface run-time environment and the DB2 ODBC driver) is included with the DB2 Connect Personal Edition.

This support enables applications developed using ODBC and DB2 CLI APIs to work with any DB2 server or DB2 Connect Personal Edition workstation. DB2 CLI application development support is provided by the DB2 Application Development Client which is packaged with a DB2 Connect server.

Before DB2 CLI or ODBC applications can access DB2, the DB2 CLI packages must be bound on any remote server to be accessed by this application. See "Binding Database Utilities" on page 73 for specific details.

The following general steps are required on DB2 Connect Personal Edition to give DB2 CLI and ODBC applications access to remote DB2 databases. These instructions assume that you have successfully connected to DB2 using a valid user ID and password. Depending on the platform many of these steps are automatic.

Step 1. Use the Control Center to add the database so that its instances and databases can be made known to the Control Center, then add the instances and databases for that system. (Your local system is represented by **Local** icon.) If you do not have access to this program you can use the **catalog** command in the command line processor.

Step 2. The DB2 CLI/ODBC driver is an optional component that you can install. Be sure it is was installed at that point.

Step 3. To access the DB2 database from ODBC/CLI:

a. The ODBC Driver Manager (From Microsoft or other vendor) must already be installed.

b. The DB2 databases must be registered as ODBC data sources. The ODBC driver manager does not read the DB2 catalog information; instead it references its own list of data sources.

c. If a DB2 table does not have a unique index then many ODBC applications will open it as read-only. A unique index should be created for each DB2 table that is to be updated by an ODBC application. Refer to the **CREATE INDEX** statement in the *SQL Reference*. Using the Control Center you would alter the settings of the table, then select the **Primary Key** tab and move one or more columns from the available columns list over to the primary key columns list. Any column you select as part of the primary key must be defined as NOT NULL.

Step 4. If necessary, you can set various CLI/ODBC Configuration Keywords to modify the behavior of DB2 CLI/ODBC and the applications using it.

If you followed the above steps to install ODBC support, and added DB2 databases as ODBC data sources, your ODBC applications will now be able to access them.

Platform Specific Details for CLI/ODBC Access

Before DB2 CLI and ODBC applications can successfully access a DB2 database from a UNIX client, perform the following steps on the client system:

1. The DB2 database (and node if the database is remote) must be cataloged. To do so, use the command line processor.

   For more information see the **CATALOG DATABASE** and **CATALOG NODE** commands in the *Command Reference*.

2. The DB2 CLI/ODBC driver is an optional component during the DB2 client install. Be sure it is selected at that point.

3. If you are using ODBC applications to access DB2 data, perform the following steps. (If you are using only CLI applications, skip this step and go to the next step.)

   a. When using an ODBC application you must ensure that an ODBC Driver Manager is installed and that each user that will use ODBC has access to it. DB2 does not install an ODBC Driver Manager, you must use the ODBC Driver Manager that was supplied with your ODBC client application or ODBC SDK in order to access DB2 data using that application.

   b. The Driver Manager uses two initialization files.

      odbcinst.ini   ODBC Driver Manager's configuration file indicating which database drivers are installed. Each user that will use ODBC must have access to this file.

      .odbc.ini   End-user's data source configuration. Each user ID has a separate copy of this file in their home directory. Note that the file starts with a dot.

      Setting up odbcinst.ini

      The settings in this file impact all of the ODBC drivers on the machine.

      Use an ASCII editor to update this file. It must have a stanza (section) called [IBM DB2 ODBC DRIVER], with a line starting with "Driver" indicating the full path to the DB2 ODBC driver (db2.o). For example, if the home directory of your end user is /home/thisuser/ and the sqllib directory is installed there, then the correct entry would be:

      ```
      [IBM DB2 ODBC DRIVER]
      Driver=/home/thisuser/sqllib/lib/db2.o
      ```

Setting up .odbc.ini

The settings in this file are associated with a particular user on the machine; different users can have different `odbc.ini` files.

The `.odbc.ini` file must exist in the end user's home directory (note the dot at the start of the file name). Update this file, using an ASCII editor, to reflect the appropriate data source configuration information. To register a DB2 database as an ODBC data source there must be one stanza (section) for each DB2 database.

The `.odbc.ini` file must contain the following lines:
- in the [ODBC Data Source] stanza:

      SAMPLE=IBM DB2 ODBC DRIVER

  Indicates that there is a data source called SAMPLE that used the IBM DB2 ODBC DRIVER.
- in the [SAMPLE] stanza:

      [SAMPLE]
      Driver=/home/thisuser/sqllib/lib/db2.o
      Description=Sample DB2 ODBC Database

  Indicates that the SAMPLE database is part of the DB2 instance located in the directory `/home/thisuser`.
- in the [ODBC] stanza:

      InstallDir=/home/thisuser/sqllib/odbclib

  Indicates that `/home/thisuser/sqllib/odbclib` should be treated as the location where ODBC is installed.
- Ensure that the InstallDir correctly points to the ODBC Driver Manager location.

  For example, if the ODBC Driver Manager has been installed in `/opt/odbc`, the [ODBC] stanza would look like:

      [ODBC]
      Trace=0
      TraceFile=odbctrace.out
      InstallDir=/opt/odbc

See the sample file in the `sqllib/odbclib` subdirectory for an example.

Once the .ini files are set up you can run your ODBC application and access DB2 databases. Refer to the documentation that comes with your ODBC application for additional help and information.
4. Configure the DB2 CLI/ODBC driver (Optional).

There are various keywords and values that can be used to modify the behavior of DB2 CLI/ODBC and the applications using it. The keywords are associated with the database *alias name*, and affect all DB2 CLI/ODBC applications that access the database.

For information on manually editing this file (db2cli.ini), see "Configuring db2cli.ini" on page 79. For information about the specific keywords refer to the *CLI Guide and Reference*.

If you require additional information at this point you can refer to the following topics in "Detailed Configuration Information":

- "How to Bind the DB2 CLI/ODBC Driver to the Database"
- "How to Set CLI/ODBC Configuration Keywords"
- "Configuring db2cli.ini" on page 79

Detailed Configuration Information

The section "Platform Specific Details for CLI/ODBC Access" on page 76 should provide you with all of the information you require. The following additional information is useful where DB2 tool support is not available, and for administrators who require more detailed information.

The following topics are covered in this section:

- "How to Bind the DB2 CLI/ODBC Driver to the Database"
- "How to Set CLI/ODBC Configuration Keywords"
- "Configuring db2cli.ini" on page 79

How to Bind the DB2 CLI/ODBC Driver to the Database

The CLI/ODBC driver will autobind on the first connection to the database, provided the user has the appropriate privilege or authorization. The administrator may want to perform the first connect or explicitly bind the required files. For more information, see "Binding Database Utilities" on page 73.

How to Set CLI/ODBC Configuration Keywords

DB2 CLI can be configured further by manually editing the db2cli.ini file.

This file contains various keywords and values that can be used to modify the behavior of DB2 CLI and the applications using it. The keywords are associated with the database *alias name*, and affect all DB2 CLI and ODBC applications that access the database.

By default, the location of the CLI/ODBC configuration keyword file is located in the in the *INSTHOME*/sqllib/cfg directory (where *INSTHOME* is the home directory of the instance owner) that is running the CLI/ODBC applications on Linux platforms.

The environment variable *DB2CLIINIPATH* can also be used to override the default and specify a different location for the file.

The configuration keywords enable you to:

- Configure general features such as data source name, user name, and password.
- Set options that will affect performance.
- Indicate query parameters such as wild card characters.
- Set patches or work-arounds for various ODBC applications.
- Set other, more specific features associated with the connection, such as code pages and IBM Graphic data types.

For a complete description of keywords and their usage, refer to the *Installation and Configuration Supplement* online document.

Configuring db2cli.ini: The db2cli.ini initialization file is an ASCII file which stores values for the DB2 CLI configuration options. A sample file is shipped to help you get started. Refer to the *CLI Guide and Reference* for information on each keyword.

See "Platform Specific Details for CLI/ODBC Access" on page 76 for more information on how to modify this file on your platform.

Running Java Programs

You can develop Java programs to access DB2 databases with the appropriate Java Development Kit (JDK) on Linux platforms. The JDK includes Java Database Connectivity (JDBC), a dynamic SQL API for Java.

For DB2 JDBC support, you must include the DB2 Java Enablement component when you install the DB2 Connect Personal Edition. With DB2 JDBC support, you can build and run JDBC applications and applets. These contain dynamic SQL only, and use a Java call interface to pass SQL statements to DB2.

The DB2 Application Development Client provides support for Java embedded SQL (SQLJ). With DB2 SQLJ support and DB2 JDBC support you can build and run SQLJ applications and applets. These contain static SQL and use embedded SQL statements that are bound to the DB2 database.

Java can also be used on the server to create JDBC and SQLJ stored procedures and user-defined functions (UDFs).

Building and running different types of Java programs requires support from different components of DB2:

- To build JDBC applications, you must install a DB2 client with the DB2 Java Enablement component. To run JDBC applications, your DB2 client with the DB2 Java Enablement component must connect to a DB2 server.
- To build SQLJ applications, you must install the DB2 Application Development Client. To run SQLJ applications, your DB2 client with the DB2 Java Enablement component must connect to a DB2 server.
- To build JDBC applets, you must install a DB2 client with the DB2 Java Enablement component. To run JDBC applets, the client machine does not require any DB2 components.
- To build SQLJ applets, you must install the DB2 Application Development Client. To run SQLJ applets, the client machine does not require any DB2 components.

For detailed information on building and running JDBC and SQLJ programs refer to the*Application Building Guide*. For more information on DB2 programming in Java, refer to the *Application Development Guide*. This covers creating and running JDBC and SQLJ applications, applets, stored procedures and UDFs.

For the latest, updated DB2 Java information, visit the Web Page at: http://www.software.ibm.com/data/db2/java

Configuring the Environment

To build and run DB2 Java programs, you need to install and configure the appropriate IBM version of the Java Development Kit (JDK) on your development machine. For your DB2 Connect Personal Edition for Linux product, you require the Java Development Kit (JDK) 1.1.8, or later.

For information on installing and configuring any of the above JDKs, please refer to: http://www.software.ibm.com/data/db2/java

For all supported platforms, you must also install and configure a DB2 client with the DB2 Java Enablement component. To bind SQLJ programs to a database, you must install and configure the Application Development Client.

To run DB2 Java stored procedures or UDFs, you also need to update the DB2 database manager configuration to include the path where the JDK version 1.1 is installed on your development machine. You can do this by entering the following on the command line:

```
db2 update dbm cfg using JDK11_PATH /home/smith/jdk11
```

where /home/smith/jdk11 is the path where the JDK version 1.1 is installed.

You can check the DB2 database manager configuration to verify the correct value for the JDK11_PATH field by entering the following command:

```
db2 get dbm cfg
```

You may want to pipe the output to a file for easier viewing. The `JDK11_PATH` field appears near the beginning of the output. For more information on these commands, refer to the *Command Reference*.

To run Java programs, the following environment variables are automatically updated when you install DB2 Connect Personal Edition:

- CLASSPATH includes ″.″ and the file `sqllib/java/db2java.zip`
- LD_LIBRARY_PATH includes the directory *INSTHOME*`/sqllib/lib`, where *INSTHOME* is the home directory of the instance owner.

In order to build and run SQLJ programs, the CLASSPATH environment variable must be updated to include the following files:

- `sqllib/java/sqlj.zip`
- `sqllib/java/runtime.zip`

Java Applications

Start your application from the command line by running the Java interpreter on the executable program with this command:

```
java prog_name
```

where `prog_name` is the name of the program.

The DB2 JDBC driver handles the JDBC API calls from your application and uses the DB2 client to communicate the requests to the server and receive the results.

An SQLJ application must be bound to the database before it is run.

Java Applets

Because Java applets are delivered over the web, a web server must be installed on your DB2 machine (server or client).

To run your applet, make sure your `.html` file is properly configured. Start the JDBC applet server on the TCP/IP port specified in the `.html` file. For example, if you specified:

```
param name=port value='6789'
```

then enter the following command in the command line processor:

```
db2jstrt 6789
```

You must ensure that your working directory is accessible to your web browser. If it is not, copy your applet's `.class` and `.html` files into a directory that is accessible. For SQLJ applets, you must also copy the profile `.class` and `.ser` files as well.

Copy the `sqllib/java/db2java.zip` file into the same directory as these other files. For SQLJ applets, also copy the `sqllib/java/runtime.zip` file into this directory. Then on your client machine start your web browser (which supports JDK 1.1) and load the `.html` file.

When your applet calls the JDBC API to connect to DB2, the JDBC driver establishes separate communications with the DB2 database through the JDBC applet server residing on the DB2 server.

An SQLJ applet must be bound to the database before it is run.

Chapter 10. Configuring Client to LAN-Based Server Communications Using the Command Line Processor

To configure a client to communicate with a server, the remote server must be configured to accept in-bound requests for the communication protocol that you want to use. By default, the installation program automatically detects and configures any protocols running on a server.

If you have added a new protocol to your network, or wish to change any of the default settings on the server, refer to the *Installation and Configuration Supplement*.

This section describes how to configure a DB2 client to communicate with a DB2 server that does not reside on a host or AS/400 system using the command line processor.

For instructions on entering DB2 commands, see "Entering Commands Using the Command Center" on page 99 or "Entering Commands Using the Command Line Processor" on page 101.

Configuring TCP/IP on the Client

This section assumes that TCP/IP is functional on the client and server workstations. See "Software Requirements" on page 26 for the communication protocol requirements for your platform. See "Possible Client-to-Server Connectivity Scenarios" on page 26 for the supported communication protocols for your particular client and server.

To set up TCP/IP communications on a DB2 client, perform the following steps:

Step 1. Identify and record parameter values.

Step 2. Configure the client:

    a. Resolve the server's host address.

    b. Update the services file.

    c. Catalog a TCP/IP node.

    d. Catalog the database.

Step 3. Test the connection between the client and server.

Due to the characteristics of the TCP/IP protocol, TCP/IP may not be immediately notified of the failure of a partner on another host. As a result, a client application accessing a remote DB2 server using TCP/IP, or the corresponding agent at the server, may sometimes appear to be hung. DB2 uses the TCP/IP SO_KEEPALIVE socket option to detect when there has been a failure and the TCP/IP connection has been broken.

If you are experiencing problems with your TCP/IP connection, refer to the *Troubleshooting Guide* for information on how to adjust this parameter and other common TCP/IP problems.

Step 1. Identify and Record Parameter Values

As you proceed through the configuration steps, complete the *Your Value* column in the following table. You can fill in some of the values before you start configuring this protocol.

Table 9. TCP/IP Values Required at the Client

Parameter	Description	Sample Value	Your Value
Host Name • Hostname (*hostname*) or • IP address (*ip_address*)	Use the *hostname* or *ip_address* of the remote server workstation. To resolve this parameter: • Enter the **hostname** command at the server to obtain the *hostname*. • Contact your network administrator to obtain the *ip_address* or enter the **ping** *hostname* command.	serverhost or 9.21.15.235	

Table 9. TCP/IP Values Required at the Client (continued)

Parameter	Description	Sample Value	Your Value
Service Name • Connection Service name (*svcename*) or • Port number/Protocol (*port_number/tcp*)	Values required in the `services` file. The Connection Service name (*svcename*) is an arbitrary name that represents the Port number (*port_number*) on the client. The port number for the client must be the same as the port number that the *svcename* parameter maps to in the `/etc/services` file at the server. (The *svcename* parameter is located in the database manager configuration file on the server.) This value must not be in use by any other applications, and must be unique within the `services` file. This value generally must be 1024 or higher. Contact your database administrator for the values used to configure the server or enter the **db2 get dbm cfg** command on the server.	db2cdb2inst1 50000/tcp	
Node name (*node_name*)	A local alias, or nickname, that describes the remote server (referred to as a node) to which you are trying to connect. You can choose any name you want; however, all node name values within your local node directory must be unique.	db2node	

Step 2. Configure the Client

The following steps configure this protocol on the client. Replace the sample values with your worksheet values.

A. Resolve the Server's Host Address

> If your network has a name server, or you are planning to directly specify the IP address (*ip_address*) of the server, skip this step and proceed to "B. Update the Services File".

The client must know the address of the server with which it is attempting to establish communications. If a name server does not exist on your network, you may directly specify a hostname that maps to the IP address (*ip_address*) of the server in the local hosts file. The hosts file for your platform is located in the /etc directory.

> If you plan to support a Linux client that uses Network Information Services (NIS), and your network does not use a name server, you must update the hosts file located on your NIS master server.

Edit the client's hosts file and add an entry for the server's hostname. For example:

```
9.21.15.235     serverhost  # host address for serverhost
```

where:

9.21.15.235   is the *ip_address* of the remote DB2 server.

serverhost   is the remote DB2 server's *hostname*.

\#   denotes the start of a comment that describes this entry

> If the server is not in the same domain as the client, you must provide a fully qualified domain name such as serverhost.vnet.ibm.com, where vnet.ibm.com is the domain name.

B. Update the Services File

> If you plan to catalog a TCP/IP node using a port number (*port_number*), skip this step and go to "C. Catalog a TCP/IP Node" on page 87.

Using a local text editor, add the Connection Service name and port number to the client's services file for TCP/IP support. The services file for your platform is located in the /etc directory. For example:

```
db2cdb2inst1  50000/tcp  # DB2 connection service port for remote server
```

where:

db2cdb2inst1
> is an arbitrary unique connection service name in the client's
> /etc/services file.

50000   is the port number that the *svcename* maps to on the remote DB2
server. You must use the same port number on the DB2 client and the
DB2 server.

tcp   is the communication protocol that you are using

denotes the start of a comment that describes this entry

The port number used on the client must match the port number used on the
server.

> If you are planning on supporting a Linux client that uses Network
> Information Services (NIS), you must update the services file
> located on your NIS master server.
>
> The file called services is located in the /etc directory.

C. Catalog a TCP/IP Node
You must add an entry to the client's node directory to describe the remote
server node. This entry specifies the chosen alias (*node_name*), the *hostname* or
ip_address, and the *svcename* or *port_number* that the client will use to access
the remote server.

To catalog a TCP/IP node, perform the following steps:

Step 1. Log on to the system with a valid DB2 user ID. For more
information, see "Appendix D. Naming Rules" on page 109.

> If you are adding a database to a system that has a DB2 Connect
> server product installed, log on to this system as a user with System
> Administrative (SYSADM) or System Controller (SYSCTRL) authority
> on the instance. For more information, see "Working with the System
> Administrative Group" on page 102.
>
> This restriction is controlled by the *catalog_noauth* database manager
> configuration parameter. For more information, refer to the
> *Administration Guide*.

Step 2. Set up the instance environment and invoke the DB2 command line
processor by entering one of the following commands:

```
. INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
source INSTHOME/sqllib/db2cshrc (for C shell)
```

where *INSTHOME* represents the home directory of the instance.

Step 3. Catalog the node by entering the following commands:

```
db2 "catalog tcpip node node_name remote [hostname|ip_address]
     server [svcename|port_number"
db2 terminate
```

For example, to catalog the remote server *serverhost* on the node called *db2node*, using the service name *db2cdb2inst1*, enter the following commands:

```
db2 "catalog tcpip node db2node remote serverhost server db2cdb2inst1"
db2 terminate
```

To catalog a remote server with the IP address *9.21.15.235* on the node called *db2node*, using the port number *50000*, enter the following:

```
db2 "catalog tcpip node db2node remote 9.21.15.235 server 50000"
db2 terminate
```

If you need to change values that were set with the **catalog node** command, perform the following steps:

Step 1. Run the **uncatalog node** command in the command line processor as follows:

```
db2 "uncatalog node node_name"
```

Step 2. Recatalog the node with the values that you want to use.

D. Catalog the Database

Before a client application can access a remote database, the database must be cataloged on the server node and on any client nodes that will connect to it. When you create a database, it is automatically cataloged on the server with the database alias (*database_alias*) the same as the database name (*database_name*). The information in the database directory, along with the information in the node directory, is used on the client to establish a connection to the remote database.

To catalog a database on the client, perform the following steps:

Step 1. Log on to the system with a valid DB2 user ID. For more information, see "Appendix D. Naming Rules" on page 109.

	If you are adding a database to a system that has a DB2 Connect server product installed, log on to this system as a user with System Administrative (SYSADM) or System Controller (SYSCTRL) authority on the instance. For more information, see "Working with the System Administrative Group" on page 102.
	This restriction is controlled by the *catalog_noauth* database manager configuration parameter. For more information, refer to the *Administration Guide*.

Step 2. Fill in the *Your Value* column in the following worksheet.

Table 10. Worksheet: Parameter Values for Cataloging Databases

Parameter	Description	Sample Value	Your Value
Database name (*database_name*)	The database alias (*database_alias*) of the *remote* database. When you create a database, it is automatically cataloged on the server with the database alias (*database_alias*) the same as the database name (*database_name*).	sample	
Database alias (*database_alias*)	An arbitrary local nickname for the remote database, on the client. If you do not provide one, the default is the same as the database name (*database_name*). This is the name that you use when connecting to a database from a client.	tor1	
Node name (*node_name*)	The name of the node directory entry that describes where the database resides. Use the same value for node name (*node_name*) that you used to catalog the node in the previous step.	db2node	

Step 3. Set up the instance environment and invoke the DB2 command line processor by entering one of the following commands:

```
. INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
source INSTHOME/sqllib/db2cshrc (for C shell)
```

where *INSTHOME* represents the home directory of the instance.

Step 4. Catalog the database by entering the following commands:

```
db2 "catalog database database_name as database_alias at node node_name"
db2 terminate
```

For example, to catalog a remote database called SAMPLE so that it has the alias *tor1*, on the node *db2node*, enter the following commands:

```
db2 "catalog database sample as tor1 at node db2node"
db2 terminate
```

> If you need to change values that were set with the **catalog database** command, perform the following steps:
>
> Step a. Enter the **uncatalog database** command as follows:
>
> ```
> db2 "uncatalog database database_alias"
> ```
>
> Step b. Recatalog the database with the value that you want to use.

Step 3. Test the Client-to-Server Connection

When you have finished configuring the client for communications, perform the following steps to test the connection:

> You will need to connect to a remote database to test the connection.

Step 1. Start the database manager by entering the **db2start** command on the server (if it was not automatically started at boot time).

Step 2. Enter the following command to connect the client to the remote database:

```
db2 "connect to database_alias user userid using password"
```

The values for *userid* and *password* must be valid for the system on which they are authenticated. By default, authentication takes place on the server for a DB2 server and on the host or AS/400 machine for a DB2 Connect server.

Authentication for connecting to host databases is set while configuring the DB2 Connect server. For more information, refer to the *DB2 Connect User's Guide*.

If the connection is successful, you will get a message showing the name of the database to which you have connected. You are now able to retrieve data from that database. For example, to retrieve a list of all the table names listed in the system catalog table, enter the following command:

```
"select tabname from syscat.tables"
```

When you are finished using the database connection, enter the **db2 connect reset** command to end the database connection.

> You are now ready to start using DB2. For more advanced topics, refer to the *Administration Guide* and the *Installation and Configuration Supplement*.

Troubleshooting the Client-to-Server Connection

If the connection fails, check the following items:

At the *server*:

__ 1. The *db2comm* registry value includes the value `tcpip`.

> Check the settings for the *db2comm* registry value by entering the **db2set DB2COMM** command. For more information, refer to the *Administration Guide*.

__ 2. The `services` file was updated correctly.

__ 3. The service name (*svcename*) parameter was updated correctly in the database manager configuration file.

__ 4. The database was created and cataloged properly.

__ 5. The database manager was stopped and started again (enter the **db2stop** and **db2start** commands on the server).

> If there are problems starting a protocol's connection managers, a warning message appears and the error messages are logged in the `db2diag.log` file. This file is located in the *INSTHOME*/sqllib/db2dump directory, where *INSTHOME* represents home directory of the instance owner.
>
> For more information on the `db2diag.log` file, refer to the *Troubleshooting Guide*.

At the *client*:

__ 1. If used, the `services` and `hosts` files were updated correctly.

__ 2. The node was cataloged with the correct hostname (*hostname*) or IP address (*ip_address)*.

__ 3. The port number matches, or the service name maps to, the port number used on the server.

__ 4. The node name (*node_name*) that was specified in the database directory points to the correct entry in the node directory.

__ 5. The database was cataloged properly, using the *server's* database alias (*database_alias*) that was cataloged when the database was created on the server, as the database name (*database_name*) on the client.

If the connection still fails after you verify these items, refer to the *Troubleshooting Guide*.

Part 6. Appendixes

Appendix A. Contents of the DB2 Products for Linux

This section lists the contents of various DB2 products available for Linux platforms.

Packaging

The following DB2 product packages are available for installation:

Table 11. DB2 Components, Packages or Filesets

	Linux
DB2 Client	db2cliv71-7.1.0-0.i386.rpm
Java Support (JDBC)	db2jdbc71-7.1.0-0.i386.rpm
DB2 Control Center	db2wcc71-7.1.0-0.i386.rpm
Administration Server	db2das71-7.1.0-0.i386.rpm
DB2 Run-time Environment	db2rte71-7.1.0-0.i386.rpm
DB2 Sample Database Source	db2smpl71-7.1.0-0.i386.rpm
DB2 Engine	db2engn71-7.1.0-0.i386.rpm
DB2 Replication	db2repl71-7.1.0-0.i386.rpm
DB2 Connect	db2conn71-7.1.0-0.i386.rpm
DB2 Communication Support - TCP/IP	db2crte71-7.1.0-0.i386.rpm
Common Jar Files	db2cj71-7.1.0-0.i386.rpm
License Support of DB2 Connect Personal Edition	db2cplic71-7.1.0-0.i386.rpm
License Support of DB2 Personal Edition	db2pelic71-7.1.0-0.i386.rpm
Application Development Tools	db2adt71-7.1.0-0.i386.rpm
DB2 ADT Sample Programs	db2adts71-7.1.0-0.i386.rpm
Code Page Conversion Tables - Uni Code Support	db2cucs71-7.1.0-0.i386.rpm
Code Page Conversion Tables - Japanese	db2cnvj71-7.1.0-0.i386.rpm
Code Page Conversion Tables - Korean	db2cnvk71-7.1.0-0.i386.rpm
Code Page Conversion Tables - Simplified Chinese	db2cnvc71-7.1.0-0.i386.rpm
Code Page Conversion Tables - Traditional Chinese	db2cnvt71-7.1.0-0.i386.rpm

Table 11. DB2 Components, Packages or Filesets (continued)

	Linux
DB2 Product Messages - %L [1, 2]	db2ms%L71-7.1.0-0.i386.rpm
DB2 Product Document (HTML) - %L [1]	db2ht%L71-7.1.0-0.i386.rpm

Notes:

1. %L in the fileset name represents the locale name. There is a separate fileset for each locale. While DB2 Product Messages and Documentation are translated in several locales, not every message catalog or book is translated in every locale. For a complete list of DB2-supported locales, refer to the *Administration Guide*.

2. English messages are always installed.

Products and Selectable Components

Table 12 lists the DB2 products and selectable components that you can install.

Table 12. Components for DB2 Products

Product / Component Description	DB2 client	DB2 UDB Personal Edition	DB2 Connect
DB2 client	✔✔	✔✔	✔✔
Java Support (JDBC)	✔	✔	✔
DB2 Control Center support	..	✔	✔
Administration Server	n/a	✔✔	✔✔
DB2 Run-time Environment	n/a	✔✔	✔✔
DB2 Sample Database Source	n/a	✔✔	n/a
DB2 Engine	n/a	✔✔	n/a
DB2 Connect	n/a	n/a	✔✔
Local Warehouse Control Database	n/a	✔	n/a
Distributed Join for DB2 Data Sources	n/a	✔	n/a
Information Catalog for the Web	o	o	o
Communication Support for TCP/IP	n/a	✔✔	✔✔
Code Page Conversion Tables - Japanese	n/a	✔	✔
Code Page Conversion Tables - Korean	n/a	✔	✔
Code Page Conversion Tables - Simplified Chinese	n/a	✔	✔
Code Page Conversion Tables - Traditional Chinese	n/a	✔	✔
DB2 Replication	n/a	✔	✔

Table 12. Components for DB2 Products (continued)

Product / Component Description	DB2 client	DB2 UDB Personal Edition	DB2 Connect
DB2 Product Messages (non-English)[1]	n/a	o	o
DB2 Product Library (HTML)[1]	n/a	o	o

✔✔   This is a required component that must be installed.

✔   This is a recommended component that is installed by default. You can choose not to install this component.

o   This is an optional component that is not installed by default. If you want to install it, you must select it.

..   This component is available with the DB2 Administration Client only.

Note: There is a separate component of the DB2 Product Messages and the DB2 Product Library for each locale.

Appendix B. Basic Task Knowledge

This section describes the basic tasks that you will need to know to use this product effectively.

Go to the section that describes the task that you want to perform:
- "Starting the License Registration Tool".
- "Starting the Control Center".
- "Entering Commands Using the Command Center".
- "Entering Commands Using the Command Line Processor" on page 101.
- "Working with the System Administrative Group" on page 102.

Starting the License Registration Tool

DB2 license registration is handled automatically if you installed your DB2 product from CD-ROM using the DB2 Installer program. If you installed DB2 using your Linux operating system's native installation tools, you must enter the **db2licm** command to register DB2. Refer to the *Command Reference* for more information.

Starting the Control Center

You must have the prerequisite Java Runtime Environment (JRE) version 1.1.8 or later to launch the Control Center using this command. For more information on setting up the Control Center to run on your system, refer to the *Installation and Configuration Supplement*.

To start the Control Center, enter the **db2cc** command at a command prompt.

Entering Commands Using the Command Center

This section describes how to enter commands using the Command Center. The Command Center provides an interactive window to:
- Run SQL statements, DB2 commands, and operating system commands.
- See the execution result of SQL statements and DB2 commands in a results 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 run a script file.
- See the execution plan and statistics associated with a SQL statement before execution. You do this by invoking Visual Explain in the interactive window.
- Get quick access to database administrative tools from the main tool bar.
- Display all the command scripts known to the system through the Script Center, with summary information listed for each.

Start the Command Center in one of the follows ways:
- Click on the **Command Center** icon in the Control Center.
- Enter the **db2cctr** command.

> You must have the prerequisite Java Runtime Environment (JRE) level to launch the Command Center using this command.

The Command Center contains a large input area in which you enter your commands. To run the commands you have entered, click on the **Execution** icon (the gears icon), or press **CTRL+Enter**.

> In the Command Center, you do not have to enter a command with the db2 prefix; instead, you just enter the DB2 command. For example:
>
> ```
> list database directory
> ```
>
> To enter operating system commands, precede the operating-system command with an exclamation mark (!). For example:
>
> ```
> !ls
> ```

If you want to enter multiple commands, you must end each command with the termination character, then press then **Enter** key to start the next command on a new line. The default termination character is a semicolon (;). To specify a different termination character, click on the **Tools Settings** icon in the menu toolbar.

For example, you could connect to a database called SAMPLE and list all the system tables by entering the following command:

```
connect to sample;
list tables for system
```

After you have clicked on the **Execution** icon (or pressed **CTRL+Enter**), the Command Center switches to the Results window which informs you how the commands are proceeding.

To recall commands that you have entered, select the **Script** Tab, click on the drop down box, and select a command.

To save commands as scripts, select **Script —> Save as** from the menu bar. For more information, click on the **Help** push button or press the **F1** key.

> If you want to store commonly used SQL statements or DB2 commands as scripts, click on the **Script Center** icon from the main tool bar. For more information, click on the **Help** push button or press the **F1** key.

Entering Commands Using the Command Line Processor

You can use the command line processor to enter DB2 commands, SQL statements, and operating system commands. It operates in the following modes:

Command Line Mode
Operates at any shell prompt. You can enter DB2 commands and SQL statements by prefixing the command or statement with the db2 prefix. Operating systems commands are entered directly as this is an ordinary shell prompt.

Interactive Input Mode
The db2 prefix that you use for DB2 commands (in Command Line Mode) is pre-entered for you. You can enter operating systems commands, DB2 commands, or SQL statements and view their output.

File Input Mode
Processes commands that are stored in a file. For information on the file input mode, refer to the *Command Reference*.

Command Line Mode

You can use any command window to enter a DB2 command. If you are entering commands via the Command Line Mode, you must include the db2 prefix. For example:

```
db2 list database directory
```

> If the DB2 command contains characters that have special meaning on the operating system you are using, you will need to enter the command in quotation marks to ensure that it is run properly.
>
> For example, the following command would retrieve all the information from the *employee* table, even if the * character has a special meaning on the operating system:
>
> ```
> db2 "select * from employee"
> ```

If you need to enter a long command that does not fit on one line, use the line
continuation character, \. When you have reached the end of the line, press
the **Enter** key to continue entering the command on the next line. For
example:

```
db2 select empno, function, firstname, lastname, birthdate, from \
db2 (cont.) => employee where function='service' and \
db2 (cont.) => firstname='Lily' order by empno desc
```

Interactive Input Mode

To invoke the command line processor in interactive input mode, enter the
db2 command from the command line processor

In interactive input mode, the prompt looks like this:

```
db2 =>
```

In interactive input mode, you do not have to enter DB2 commands with a
db2 prefix; instead, you just enter the DB2 command. For example:

```
db2 => list database directory
```

To enter operating system commands in interactive mode, precede the
operating-system command with an exclamation mark (!). For example:

```
db2 => !ls
```

If you need to enter a long command that does not fit on one line, use the line
continuation character, \. When you have reached the end of the line, press
the **Enter** key to continue entering the command on the next line. For
example:

```
db2 => select empno, function, firstname, lastname, birthdate, from \
db2 (cont.) => employee where function='service' and \
db2 (cont.) => firstname='Lily' order by empno desc
```

To end interactive input mode, enter the **quit** or **terminate** command.

For more information on advanced topics using the CLP, refer to the *Command
Reference*.

Working with the System Administrative Group

By default, System Administrative (SYSADM) authority is granted to any
valid DB2 username that belongs to the primary group of the instance
owner's username.

For information on how to change the default SYSADM settings and how to
assign this authority to a different user or set of users, refer to the
Administration Guide.

Appendix C. National Language Support (NLS)

Language and Codeset Support for UNIX Operating Systems

DB2 supports many code sets and locales without translating the messages for the corresponding languages. Supporting a locale means that you can create and use a database in that locale, but you may have to view all panels and messages in a different language, if translated messages are not available in DB2. For a complete list of locales supported, refer to the *Administration Guide*.

If you want to operate in a different language environment, perform the following steps:

Step 1. Ensure that the appropriate message option for the desired language has been installed.

Step 2. Set the *LANG* environment variable to the desired locale.

For example, to use fr_FR messages on DB2 for Linux, you must have the fr_FR message option installed and must set *LANG* to fr_FR.

The selected message catalog filesets are placed in the following directory on the target workstation:

```
/usr/IBMdb2/V7.1/msg/%L
```

where *%L* is equal to the locale name of the message catalog.

Conversion of Character Data

When character data is transferred between machines, it must be converted to a form that the receiving machine can use.

For example, when data is transferred between the DB2 Connect workstation and a host or AS/400 database server, it is usually converted from a workstation code page to a host CCSID, and vice versa. If the two machines use different code pages or CCSIDs, code points are mapped from one code page or CCSID to the other. This conversion is always performed at the receiver.

Character data sent *to* a database consists of SQL statements and input data. Character data sent *from* a database consists of output data. Output data that is interpreted as bit data (for example, data from a column declared with the FOR BIT DATA clause) is not converted. Otherwise all input and output character data is converted if the two machines have different code pages or CCSIDs.

For example, if DB2 Connect is used to access OS/390 data, the following happens:

1. DB2 Connect sends an SQL statement and input data to OS/390.
2. DB2 Universal Database for OS/390 converts the data to an EBCDIC CCSID and processes it.
3. DB2 Universal Database for OS/390 sends the result back to the DB2 Connect workstation.
4. DB2 Connect converts the result to an ASCII or ISO code page and returns it to the user.

The table that follows shows the conversions that are supported between code pages (on the workstation) and CCSIDs (on the host).

For more detailed information about supported code page conversions, refer to the *Administration Guide*.

Table 13. Workstation Code Page to Host CCSID Conversion

Host CCSIDs	Code Page	Countries
037, 273, 277, 278, 280, 284, 285, 297, 500, 871, 1140-1149	437, 819, 850, 858, 860, 863, 1004, 1051, 1252, 1275	Albania, Australia, Austria, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Latin America, Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, UK, USA
423, 875	737, 813, 869, 1253, 1280	Greece
870	852, 912, 1250, 1282	Croatia, Czech Republic, Hungary, Poland, Romania, Serbia/Montenegro (Latin), Slovakia, Slovenia
1025	855, 866, 915, 1251, 1283	Bulgaria, FYR Macedonia, Russia, Serbia/Montenegro (Cyrillic)
1026	857, 920, 1254, 1281	Turkey
424	862, 916, 1255	Israel - see note 3 below
420	864, 1046, 1089, 1256	Arabic countries - see note 3 below
838	874	Thailand
930, 939, 5026, 5035	932, 942, 943, 954, 5039	Japan
937	938, 948, 950, 964	Taiwan

Table 13. Workstation Code Page to Host CCSID Conversion (continued)

Host CCSIDs	Code Page	Countries
933, 1364	949, 970, 1363	Korea
935, 1388	1381, 1383, 1386	People's Republic of China
1112, 1122	921, 922	Estonia, Latvia, Lithuania
1025	915, 1131, 1251, 1283	Belarus
1123	1124, 1125, 1251	Ukraine

Notes:

1. Code page 1004 is supported as code page 1252.

2. In general, data can be converted from a code page to a CCSID and back again to the same code page with no change. The following are the only exceptions to that rule:

   • In double-byte character set (DBCS) code pages, some data containing user-defined characters may be lost.

   • For single-byte code pages defined within mixed-byte code pages, and for some newer single-byte code pages, characters that do not exist in both the source and the target may be mapped to substitution characters and then lost when the data is converted back to the original code page.

3. For bidirectional languages, a number of special "BiDi CCSIDS" have been defined by IBM and are supported by DB2 Connect Version 7.

   If the bidirectional attributes of the database server are different from those of the client you can use these special CCSIDS to manage the difference.

   Refer to the *Administration Guide* for details of these special CCSIDs. Refer to the Release Notes for DB2 Connect Version 7 for detailed information about how to set them up for DRDA host connections.

Bidirectional CCSID Support

The following BiDi attributes are required for correct handling of Bidirectional data on different platforms:

```
- Text type (LOGICAL vs VISUAL)
- Shaping (SHAPED vs UNSHAPED)
- Orientation (RIGHT-TO-LEFT vs LEFT-TO-RIGHT)
- Numeral shape (ARABIC vs HINDI)
- Symmetric swapping (YES or NO)
```

Since defaults on different platforms are not the same, problems appear when DB2 data is sent from one platform to another. For example, Windows platforms use LOGICAL UNSHAPED data, while data on OS/390 is usually in SHAPED VISUAL format. Therefore, without any support for these

attributes data sent from DB2 Universal Database for OS/390 to DB2 UDB on a Windows 32-bit operating systems workstation displays incorrectly.

Bidirectional-specific CCSIDs

The following bidirectional Coded Character Set Identifiers (CCSID) have been defined and are implemented with DB2 UDB:

```
CCSID -  Code  - String
      -  Page  -  Type
-------+--------+----------
 00420    420      4
 00424    424      4
 08612    420      5
 08616    424      6
 12708    420      7
X'3F00'   856      4
X'3F01'   862      4
X'3F02'   916      4
X'3F03'   424      5
X'3F04'   856      5
X'3F05'   862      5
X'3F06'   916      5
X'3F07'  1255      5
X'3F08'  1046      5
X'3F09'   864      5
X'3F0A'  1089      5
X'3F0B'  1256      5
X'3F0C'   856      6
X'3F0D'   862      6
X'3F0E'   916      6
X'3F0F'  1255      6
X'3F10'   420      6
X'3F11'   864      6
X'3F12'  1046      6
X'3F13'  1089      6
X'3F14'  1256      6
X'3F15'   424      8
X'3F16'   856      8
X'3F17'   862      8
X'3F18'   916      8
X'3F19'   420      8
X'3F1A'   420      9
X'3F1B'   424     10
X'3F1C'   856     10
X'3F1D'   862     10
X'3F1E'   916     10
X'3F1F'  1255     10
X'3F20'   424     11
X'3F21'   856     11
X'3F22'   862     11
X'3F23'   916     11
X'3F24'  1255     11
```

Where CDRA String Types are defined:

```
String -  Text -  Numerical  - Orientation -  Shaping  - Symmetrical
 Type  -  Type -    Shape    -             -           -  Swapping
---------+-------+-----------+-------------+-----------+-------------
   4      Visual    Arabic        LTR         Shaped        OFF
   5      Implicit  Arabic        LTR         Unshaped      ON
   6      Implicit  Arabic        RTL         Unshaped      ON
  7(*)    Visual    Arabic    Contextual(*)   Unshaped-Lig  OFF
   8      Visual    Arabic        RTL         Shaped        OFF
   9      Visual    Passthru      RTL         Shaped        ON
  10      Implicit            Contextual-L                  ON
  11      Implicit            Contextual-R                  ON
```

Note: Field orientation is left-to-right (LTR) when the first alphabetic character is a Latin one, and right-to-left (RTL) when it is a bidirectional (RTL) character. Characters are unshaped, but LamAlef ligatures are kept, and not broken into constituents.

Appendix D. Naming Rules

Go to the section that describes the naming rules that you require information on:

- "General Naming Rules"
- "Database, Database Alias, and Catalog Node Name Rules"
- "Object Name Rules" on page 110
- "Username, User ID, Group Name, and Instance Name Rules" on page 111
- "Password Rules" on page 112
- "DB2SYSTEM Naming Rules" on page 112
- "Workstation Name (nname) Rules" on page 111

General Naming Rules

Unless otherwise specified, all names can include the following characters:

- A through Z. When used in most names, characters A through Z are converted from lowercase to uppercase.
- 0 through 9
- @, #, $, and _ (underscore)

Unless otherwise specified, all names must begin with one of the following characters:

- A through Z
- @, #, and $

Do not use SQL reserved words to name tables, views, columns, indexes, or authorization IDs. For a list of SQL reserved words, refer to *SQL Reference*.

Database, Database Alias, and Catalog Node Name Rules

Database names are the identifying names assigned to databases in the database manager. *Database alias names* are synonyms given to remote databases. Database aliases must be unique within the System Database Directory in which all aliases are stored. *Catalog node names* are the identifying names that are assigned to entries in the node directory. Each entry in the node directory is an alias name for a computer on your network. To avoid confusions that could arise from multiple names for the same server, we recommend that you use the same catalog node name as the network name for the server.

When naming a database, database alias, or catalog node name, see "General Naming Rules" on page 109. In addition, the name you specify can *only* contain 1 to 8 characters.

> To avoid potential problems, do not use the special characters @, #, and $ in a database name if you intend to have a client remotely connect to a host database. Also, because these characters are not common to all keyboards, do not use them if you plan to use the database in another country.

Object Name Rules

Database objects include:

- Tables
- Views
- Columns
- Indexes
- User-defined functions (UDFs)
- User-defined types (UDTs)
- Triggers
- Aliases
- Table spaces
- Schemas

When naming database objects, see "General Naming Rules" on page 109.

In addition, the name you specify:

- Can contain 1 to 18 characters *except* for the following:
  - Table names (including view names, summary table names, alias names, and correlation names), which can contain up to 128 characters
  - column names, which can contain up to 30 characters
  - schema names, which can contain up to 30 characters
- Cannot be any of the SQL reserved words that are listed in the *SQL Reference*.

Using delimited identifiers, it is possible to create an object that violates these naming rules; however, subsequent use of the object could result in errors.

For example, if you create a column with a + or − sign included in the name and you subsequently use that column in an index, you will experience

problems when you attempt to reorganize the table. To avoid potential problems with the use and operation of your database, *do not* violate these rules.

Username, User ID, Group Name, and Instance Name Rules

Usernames or *User IDs* are the identifiers assigned to individual users. When naming users, groups, or instances, see "General Naming Rules" on page 109.

In addition to the general naming rules:
- User IDs on OS/2 can contain 1 to 8 characters. They cannot start with a numeric digit or end with $.
- Usernames on UNIX can contain 1 to 8 characters.
- Usernames on Windows can contain 1 to 30 characters. The Windows NT and Windows 2000 operating systems currently have a limit of 20 characters.
- Group and instance names can contain 1 to 8 characters.
- Names cannot be any of the following:
  - USERS
  - ADMINS
  - GUESTS
  - PUBLIC
  - LOCAL
- Names cannot begin with:
  - IBM
  - SQL
  - SYS
- Names cannot include accented characters.
- In general, when naming users, groups, or instances:

  OS/2   Use uppercase names.

  UNIX   Use lowercase names.

  Windows 32-bit operating systems
      Use any case.

Workstation Name (nname) Rules

A *workstation* name specifies the NetBIOS name for a database server or client that resides on the local workstation. This name is stored in the database manager configuration file. The workstation name is known as the *workstation nname*. When naming workstations, see "General Naming Rules" on page 109.

In addition, the name you specify:

- Can contain 1 to 8 characters
- Cannot include &, #, and @
- Must be unique within the network

DB2SYSTEM Naming Rules

DB2 uses the *DB2SYSTEM* name to identify a physical DB2 machine, system, or workstation within a network. On UNIX, the DB2SYSTEM name defaults to the TCP/IP hostname. On OS/2, you must specify the *DB2SYSTEM* name during install. On Windows 32-bit operating systems, you do not need to specify a *DB2SYSTEM* name; the DB2 setup program detects the Windows Computer name and assigns it to *DB2SYSTEM*.

When creating a *DB2SYSTEM* name, see "General Naming Rules" on page 109.

In addition, the name you specify:

- Must be unique within a network
- Can contain a maximum of 21 characters

Password Rules

When determining passwords, consider the following rules:

OS/2   A maximum of 14 characters.

UNIX   A maximum of 8 characters.

Windows 32-bit operating systems
        A maximum of 14 characters.

Appendix E. Using the Control Center to Administer DB2 for OS/390 and DB2 Connect Enterprise Edition Servers

DB2 Control Center is an easy to use application provided as part of the DB2 Administration tools The Control Center gives database administrators a powerful tool for managing DB2 Family databases. In Version 7, the Control Center has been greatly enhanced to deliver new management functions to database administrators who need to manage DB2 for OS/390 V5.1 and V6.1 database servers. Version 7 of the Control Center has also been enhanced to manage operational and performance characteristics of DB2 Connect Enterprise Edition connectivity servers. The combination of DB2 for OS/390 server management and new DB2 Connect monitoring support provide complete end-to-end administration and monitoring for desktop and web applications that work with DB2 for OS/390 servers.

The DB2 Control Center uses the familiar "explorer" interface to allow database administrators to easily navigate between different database servers and the database objects they manage. Context sensitive right-mouse activated menus provide administrators with the ability to change attributes of database objects and to launch commands and utilities. Database objects are presented in a consistent fashion for all DB2 family servers. This greatly reduces the amount of learning that is required for administrators who need to manage both DB2 for OS/390 and DB2 Universal Databases on Windows NT, UNIX and OS/2 servers. While the Control Center preserves consistency across servers, it does not hide capabilities that are unique to each DB2 server. This gives database administrators the power to perform all aspects of their tasks.

The ability to manage DB2 Connect connectivity servers is delivered through management of user connections and by keeping vital statistics on various performance aspects of the connectivity server. For example, database administrators can easily view all of the users connected through a particular DB2 Connect server, and their connection characteristics. Administrators can also collect load and performance information such as the number of SQL statements and transactions executed, number of bytes sent and received, statement and transaction execution times and much more. Collected data can be displayed using easy to understand live graphs.

Preparing DB2 for OS/390 Servers for the Control Center

The DB2 Control Center uses stored procedures to deliver many of its management functions. Therefore, for the Control Center to function properly each DB2 for OS/390 server that will be managed from the Control Center needs to have stored procedures enabled and the proper stored procedures installed on that server.

Consult the *DB2 for OS/390 Program Directory* for additional information on applying service and required Function Modification Identifiers.

Using the Control Center

Before you can work with a server and its databases you will need to catalog information about the server on the Control Center workstation. The DB2 Control Center only works with servers and databases that are catalogued on the workstation where the Control Center is running. To catalog information about a remote server on Linux systems, use the command line processor. For more information, see "Chapter 10. Configuring Client to LAN-Based Server Communications Using the Command Line Processor" on page 83.

Once the Control Center is running, start by clicking on the plus sign next to the server you want to administer. Select the database or connectivity server objects that you want to administer and click the right mouse button on the object to work with object properties or to execute actions on the object. Remember to press **F1** to display help as you work.

Appendix F. List Files, Bind Files, and Packages

This appendix lists the bind files contained in different `.lst` files shipped with the product. Bind packages are generated specifically for each platform. Each package name can be mapped back to the client platform.

In the following tables, under the **Package Name** columns, each DB2 bind package is represented in a coded format. For example, for the file name SQLabxYz:

- SQL identifies the bind package as a DB2 utility,
- *ab* identifies the utility,
- *x* represents the last digit of the year the product became available,
- *Y* represents the platform of the client,
- *z* represents the modification level.

You can use the **ddcspkgn** command to determine the package name for individual bind files or list (.lst) files. This command is found in the *INSTHOME*/sqllib/bin directory, where *INSTHOME* is the home directory of the instance owner.

For example, on an Linux system, enter the following command with the bind file in the local directory:

```
INSTHOME/sqllib/bin/ddcspkgn db2ajgrt.bnd
```

The *Y* value for Linux platforms maps to xLz,

List Files Associated with DRDA Servers

The following table lists which bind files are included in the `.lst` file associated with a particular DRDA host. The package associated with each bind file is also listed:

DRDA Server	List File
OS/390	ddcsmvs.lst
VM	ddcsvm.lst
OS/400	ddcs400.lst

Table 14. DRDA Bind Files and Packages

Component	Bind File Name	Package Name	AS/400	VM	OS/400
DB2 Call Level Interface					
Isolation level CS	db2clics.bnd	sqll1*xyz*	yes	yes	yes
Isolation level RR	db2clirr.bnd	sqll2*xyz*	yes	yes	yes
Isolation level UR	db2cliur.bnd	sqll3*xyz*	yes	no	yes
Isolation level RS	db2clirs.bnd	sqll4*xyz*	yes	no	yes
Isolation level NC	db2clinc.bnd	sqll5*xyz*	yes	no	yes
Using MVS table names	db2clims.bnd	sqll7*xyz*	no	no	no
Using OS/400 table names (OS/400 3.1 or later)	db2clias.bnd	sqlla*xyz*	yes	no	yes
Using VSE/VM table names	db2clivm.bnd	sqll8*xyz*	no	yes	no
Command Line Processor					
Isolation level CS	db2clpcs.bnd	sqlc2*xyz*	yes	yes	yes
Isolation level RR	db2clprr.bnd	sqlc3*xyz*	yes	yes	yes
Isolation level UR	db2clpur.bnd	sqlc4*xyz*	yes	yes	yes
Isolation level RS	db2clprs.bnd	sqlc5*xyz*	yes	no	yes
Isolation level NC	db2clpnc.bnd	sqlc6*xyz*	yes	no	yes
REXX					
Isolation level CS	db2arxcs.bnd	sqla1*xyz*	yes	yes	yes
Isolation level RR	db2arxrr.bnd	sqla2*xyz*	yes	yes	yes
Isolation level UR	db2arxur.bnd	sqla3*xyz*	yes	yes	yes
Isolation level RS	db2arxrs.bnd	sqla4*xyz*	yes	yes	yes
Isolation level NC	db2arxnc.bnd	sqla5*xyz*	yes	no	yes
Utilities					
Export	db2uexpm.bnd	sqlub*xyz*	yes	yes	yes
Import	db2uimpm.bnd	sqluf*xyz*	yes	yes	yes
Import	db2uimtb.bnd	db2uk*xyz*	yes	yes	yes

Appendix G. 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 131. 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 127. 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

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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 130
- "Searching Information Online" on page 134
- "Ordering the Printed Books" on page 127
- "Printing the PDF Books" on page 126

Table 15. 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 15. 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 15. 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 15. 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 15. 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 15. 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 15. 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 15. 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 15 on page 118.

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 16. 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 131 for details.

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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

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http://www.elink.ibmlink.ibm.com/pbl/pbl/
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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.

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