CHAPTER 1

DB2 Product Overview

The relational database of choice for modern distributed applications is IBM's DB2 Universal Database(UDB). Relational databases form the core backend of most enterprise scale applications because of their capability to deliver high performance, support advanced features such as transactions, and maintain data integrity. The Structured Query Language (SQL) provides a powerful standard for accessing and manipulating databases. Its widespread acceptance across all major vendors has also contributed to the success of relational database technology.

This chapter introduces major DB2 products so that you can plan the products required for your environment. This is a key to planning the DB2 UDB solution, as shown in Figure 1.1, that is suitable for your project or your organization.

OBJECTIVES

After reading this chapter you should have an understanding of the following DB2 UDB products:

- DB2 UDB Server Products
  - DB2 UDB Enterprise Server Edition (ESE)
  - DB2 UDB Workgroup Server Edition (WSE)
  - DB2 UDB Workgroup Server Unlimited Edition (WSUE)
- DB2 UDB Personal Edition (PE)
- DB2 UDB Developer's Products
  - DB2 UDB Personal Developer's Edition
  - DB2 UDB Universal Developer's Edition
- DB2 UDB Connect Products
  - DB2 UDB Connect Enterprise Edition
  - DB2 UDB Connect Unlimited Edition

- DB2 Connect Personal Edition
- DB2 Connect Application Server Edition

• DB2 UDB Clients
- DB2 Run-Time Client
- DB2 Administration Client
- DB2 Application Development Client

DB2 UDB Server Products

DB2 UDB server products provide a relational database engine for storing, maintaining, and accessing data. We will focus on understanding the main capabilities and goals of each server product, and understand how they would be used in a solution.

In this section, you will be introduced to the DB2 UDB Server family of products, shown in Figure 1.2. DB2 has the capability to store all kinds of electronic information. This includes tradi-

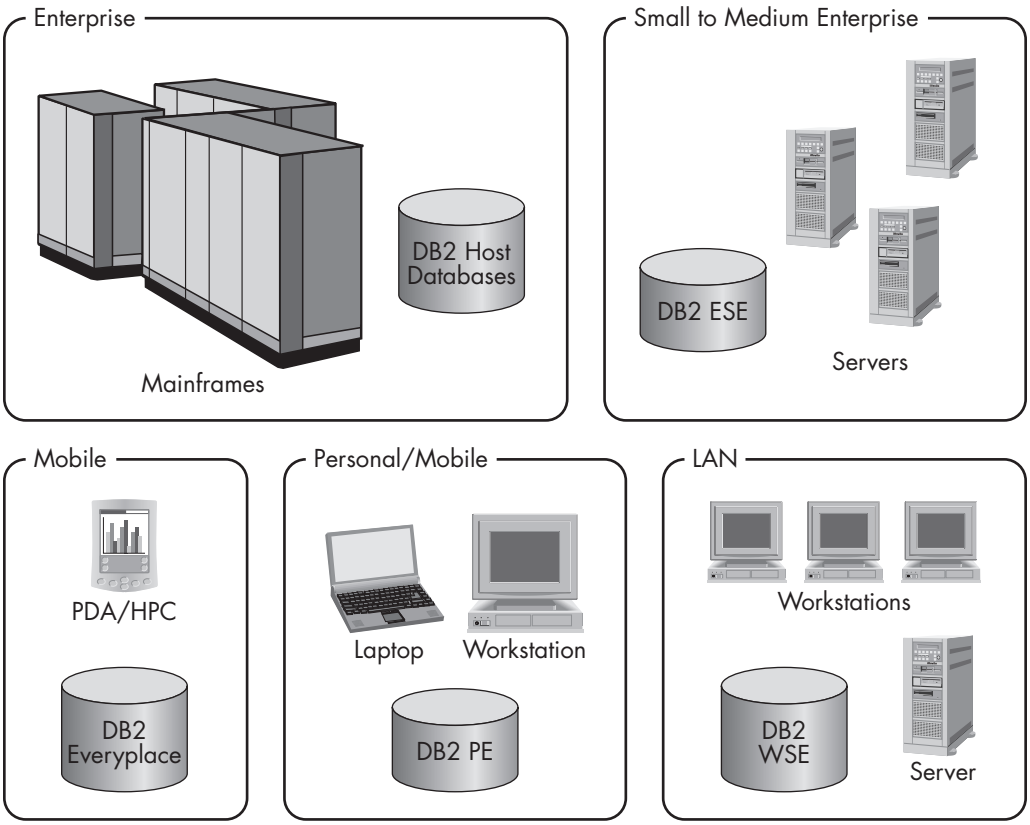

Figure 1.1
DB2 solutions for different environments.

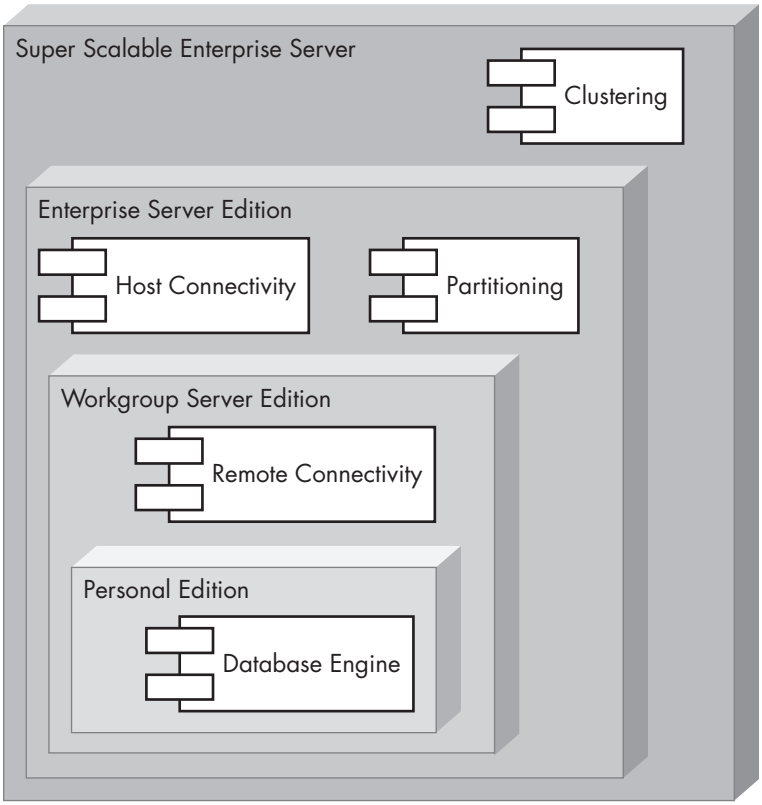

Figure 1.2
Component view of selected DB2 server products.

tional relational data as well as structured and unstructured binary information, documents and text in many languages, graphics, images, multimedia (audio and video), and information specific to operations, such as engineering drawings, maps, insurance claims forms, numerical control streams, or any type of electronic information. A description of each of the DB2 products is provided to illustrate some of the features and functions.

The DB2 database is an important part of IBM's e-business software portfolio. The e-business Application Framework provides an open blueprint of how to build e-business applications. Popular IBM e-business tools include Visual Age for Java for developing Java programs or components, and Tivoli software for distributed systems management. As for application server software, IBM offers several types of servers depending on the business requirement, from Message Queuing (MQ) software to Java-based transaction processing with WebSphere Application Server.

The following DB2 UDB editions are members of the DB2 UDB Server family:

- DB2 UDB ESE
- DB2 UDB WSE
- DB2 UDB WSUE

DB2 UDB ESE

The DB2 UDB ESE is distinguished by its scalability, reliability and availability, usability, and serviceability in medium-to-large businesses. This multi-user version of DB2 allows the creation and management of partitioned and nonpartitioned database environments. Among others, DB2 UDB ESE provides support for both local and remote clients, includes data warehouse capabilities, can be administered remotely from a satellite control database, and comes with built-in DB2 Connect functionality allowing connectivity to database systems such as DB2 for z/OS, DB2 for iSeries, and DB2 for OS/390. A complete list of the package contents of DB2 UDB ESE is shown here:

- DB2 ESE
- Administration Client
- Run-Time Client
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- Audio, Image, and Video Extenders
- WebSphere Studio Site Developer Advanced (trial)
- WebSphere MQ
- QMF for Windows (trial)
- Data Management Tools (Try & Buy)
- Database Partitioned Feature (optional)
- DB2 Net Search Extender (optional)
- DB2 Spatial Extender (optional)
- DB2 Data Links Manager (optional)
- DB2 Warehouse Manager (optional)
- DB2 Intelligent Miner Scoring (optional)
- DB2 Intelligent Miner Modeling (optional)
- DB2 Intelligent Miner Visualization (optional)

DB2 UDB ESE can be deployed on the AIX, Solaris, Linux, HP-UX, Windows NT, and Windows 2000 environments.

NEW
As of v8, DB2 UDB Enterprise Edition (EE) and DB2 UDB Enterprise-Extended Edition (EEE) are merged into a single product, namely DB2 UDB Enterprise Server Edition (ESE).

DB2 UDB WSE

DB2 UDB WSE is also a multi-user version of DB2 allowing support for both local and remote clients. It is often used over a Local Area Network (LAN). WSE also includes data warehouse capabilities, and can be administered remotely from a satellite control database. Unlike ESE, WSE does not include DB2 Connect functionality, therefore connectivity to database systems such as DB2 for z/OS, DB2 for iSeries, and DB2 for OS/390 is not allowed. WSE is geared toward smaller business installations while providing a full function database server. The WSE package contains the following:

- DB2 WSE
- Administration Client
- Run-Time Client
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- Net Search Extender (5 user limit)
- DB2 Spatial Extender (5 user limit)
- Audio, Image, and Video Extenders
- WebSphere Studio Site Developer Advanced (trial)
- WebSphere MQ
- QMF for Windows (trial)

The WSE can be deployed on AIX, Linux, Solaris, HP-UX, Windows NT, Windows 2000, and Windows XP environments with up to four CPUs.

NEW
As of v8, DB2 UDB Workgroup Edition is now called DB2 UDB Workgroup Server Edition (WSE).

DB2 UDB WSUE

DB2 UDB WSUE comes with the same features as DB2 UDB WSE with the difference that the former can be deployed in an environment which can be accessed by Internet as well as LAN users. WSUE comes packaged with the following:

- DB2 WSUE
- Administration Client
- Run-Time Client
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- Audio, Image, and Video Extenders

- WebSphere Studio Site Developer Advanced (trial)
- WebSphere MQ
- QMF for Windows (trial)
- DB2 Spatial Extender (optional)
- DB2 Net Search Extender (optional)

The WSUE can be deployed on AIX, Linux, Solaris, HP-UX, Windows NT, Windows 2000, and Windows XP environments with up to four CPUs.

> **NEW**
> As of v8, DB2 UDB Workgroup Unlimited Edition is now called DB2 UDB Workgroup Server Unlimited Edition (WSUE).

DB2 UDB PE

This full-function database offering is for single-users and will not accept remote database requests, however, it contains DB2 UDB client components and will serve as a remote client to a DB2 Server. This offering is available on Windows and Linux. In DB2 UDB v8, functionality that was previously available in the DB2 Satellite Edition has been incorporated into PE. This functionality forms part of a DB2 solution to support systems that operate disconnected from the corporate system the majority of the time and connect occasionally to a central database to exchange data.

The application areas that can benefit from this solution include contract management, insurance application automation, securities marketing, and automobile insurance claims processing. In addition, large-scale branch office deployments are being used to provide automation to franchise stores, insurance agents, and regional offices of large corporations. In these kinds of environments, the applications are custom built, purchased, or a combination of both.

PE comes packaged with the following products:

- DB2 PE
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- Net Search Extender (single user)
- DB2 Spatial Extender (single user)
- Audio, Image, and Video Extenders
- WebSphere Studio Site Developer Advanced (trial)

The DB2 UDB PE can be deployed on Linux, Windows NT, and Windows 2000.

TIP
DB2 UDB PE, WSE, and ESE share a common code base. It is easy to visualize these three products in terms of their pluggable components.

DB2 UDB Developer's Editions

DB2 UDB makes available the following packages of products for application development: the DB2 UDB Personal Developer's Edition and the DB2 UDB Universal Developer's Edition (see Figure 1.3). Both product packages can be used to develop applications that will access local or remote databases. The databases can reside on the same or heterogeneous operating systems. The supported operating systems and software that come with each edition are listed in the product's corresponding section that follows.

DB2 UDB Personal Developer's Edition

This product provides everything an application developer needs to design, develop, and test single-user desktop applications. Even though a DB2 UDB server is included in the package, it is only intended for testing the application under development. A DB2 UDB server license is

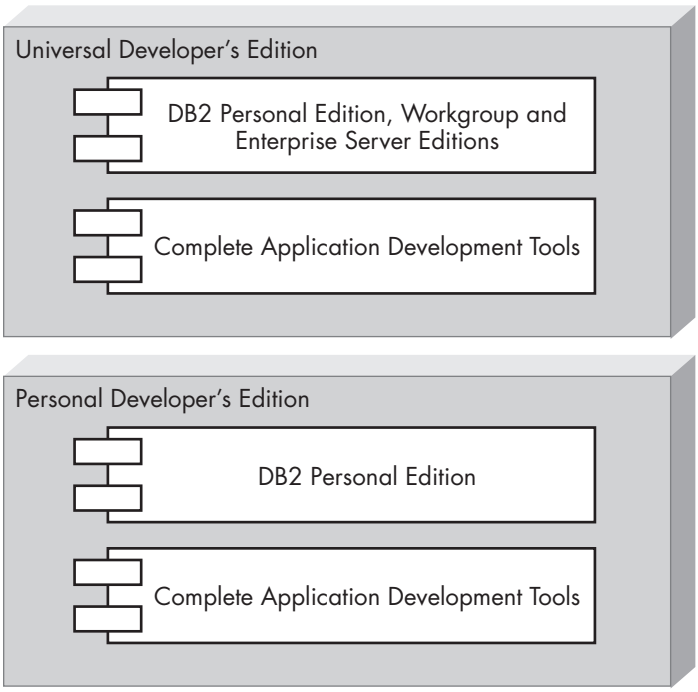

Figure 1.3
DB2 UBD Developer's products.

required if the database is to be used other than for testing purposes. This offering includes Windows and Linux versions of DB2 PE, DB2 Connect Personal Edition, and the DB2 Extenders. This package includes the following products:

- DB2 PE
- DB2 Connect Personal Edition
- Application Development Client
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- DB2 Net Search Extender
- DB2 Spatial Extender
- Audio, Image, and Video Extenders
- WebSphere Studio Site Developer Advanced (trial)
- Borland Products (30-day trial)—Borland Delphi Enterprise, Borland C++ Builder Enterprise, Borland Kylix Enterprise

The operating systems supported are Linux, Windows NT, Windows 2000, and Windows XP.

DB2 UDB Universal Developer's Edition

Unlike the DB2 UDB Personal Developer's Edition, this package includes all client and server DB2 editions, DB2 Connect, the DB2 Extenders, Warehouse Manager, and Intelligent Miner allowing customers to build solutions that utilize the latest database technologies. However, DB2 UDB servers and gateways that are included in this package are for development environments only and cannot be used in production environments without purchasing a valid license.

This package includes the following products:

- DB2 PE
- DB2 WSE
- DB2 ESE
- DB2 Connect Personal Edition
- DB2 Connect Enterprise Edition
- DB2 Data Links Manager
- DB2 Net Search Extender
- DB2 Spatial Extender
- DB2 Warehouse Manager
- DB2 Intelligent Miner Scoring
- DB2 Intelligent Miner Modeling
- DB2 Intelligent Miner Visualization
- Audio, Image, and Video Extenders
- Administration Client

- Application Development Client
- Run-Time Client
- IBM Developer Kit, Java Technology
- Distributed Debugger for Java Stored Procedures
- Complementary Products
- DB2 Everyplace Software Development Kit
- WebSphere Application Server, Advanced Developer Edition
- WebSphere Studio Site Developer Advanced (trial)
- WebSphere MQ
- QMF for Windows
- Borland Products (30-day trial)—Borland Delphi Enterprise, Borland C++ Builder Enterprise, Borland Kylix Enterprise
- Data Management Tools—DB2 Web Query Tool, DB2 Table Editor, DB2 High Performance Unload (Try & Buy), Recovery Expert (Try & Buy), Performance Expert (Try & Buy)

DB2 UDB Universal Developer's Edition is supported on Linux, AIX, HP-UX, Solaris, Windows NT, Windows 2000, and Windows XP.

DB2 UDB Connect Products

In prior versions of DB2, the DB2 Connect product was used to connect to Distributed Relational Database Architecture (DRDA) database servers. DRDA is an open standard, high-level protocol for database-related communications, and prior to DB2 UDB v8, the DRDA database servers of the DB2 world were DB2 host databases running on OS/390 (z-Series), AS/400 (i-Series), VM, and VSE. DB2 on common platforms such as Windows and UNIX used a proprietary protocol known as DB2RA.

In DB2 v8, all DB2 servers and clients use DRDA for communications, thereby adhering to a common standard. DB2 clients, however, are not licensed to access DB2 host databases directly, thus either DB2 ESE server or DB2 Connect must still be used to connect to a host database. The flavors of DB2 Connect are Enterprise Edition, Unlimited Edition, Personal Edition, and Application Server Edition. The components for each product are shown in Figure 1.4. DB2 Connect Personal Edition allows a single system to connect to a host DB2 server. It also can connect to any other DB2 server, and other DRDA servers in general, however, it does not accept remote connections.

DB2 UDB Connect Enterprise Edition

DB2 Connect Enterprise Edition is a connectivity server that concentrates and manages connections from multiple desktop clients and Web applications to DB2 database servers running on host or iSeries systems. IBM's DB2 UDB for iSeries, DB2 for OS/390 and z/OS, and DB2 for VSE and VM databases continue to be the systems of choice for managing most critical data for

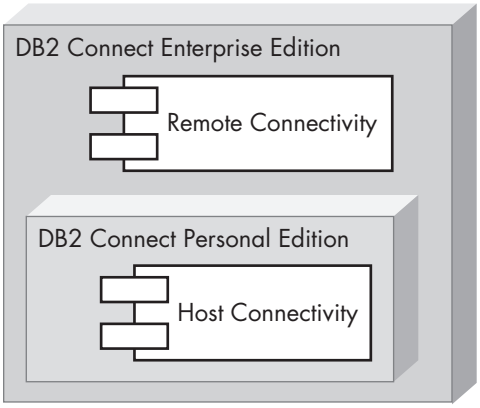

Figure 1.4
DB2 UDB Connect Enterprise Edition.

the world's largest organizations. While these host and iSeries databases manage the data, there is a great demand to integrate this data with applications running on Windows and UNIX workstations.

DB2 Connect Enterprise Edition enables local and remote client applications to create, update, control, and manage DB2 databases and host systems SQL, DB2 APIs (Application Programming Interfaces), ODBC (Open Database Connectivity), JDBC (Java Database Connectivity), SQLJ (Embedded SQLJ for Java), or DB2 CLI (Call Level Interface). In addition, DB2 Connect supports Microsoft Windows data interfaces such as ActiveX Data Objects (ADO), Remote Data Objects (RDO), and Object Linking and Embedding (OLE) DB.

DB2 Connect Enterprise Edition is currently available for AIX, HP-UX, Linux, Solaris, and Windows operating systems. These servers provide support for applications running on UNIX (AIX, HP-UX, Linux, and Solaris operating environment) and Windows workstations.

DB2 Connect Enterprise Edition is often installed on an intermediate server to connect DB2 clients to a host or iSeries database. It also can be used on machines in which multiple local users want to access the host or iSeries servers directly. For example, DB2 Connect Enterprise Edition can be installed on a large machine with many local users. It also can be installed on a Web server, a machine that is running a Transaction Processor (TP) monitor, or other three-tier application servers with multiple local SQL application processes and threads. In these cases, you can install DB2 Connect Enterprise Edition on the same machine for simplicity, or on a separate machine to off-load CPU cycles.

DB2 Connect Enterprise Edition is most appropriate for environments in which:

- Host and iSeries database servers do not support native TCP/IP connectivity and direct connectivity from desktop workstations via Systems Network Architecture (SNA) is not desirable.

- Web servers run Web-based applications.
- Web servers run Web-based applications using data-aware Java applications.
- A middle-tier application server is used.
- TP monitors, such as CICS, Encina, Microsoft Transaction Server (MTS), Tuxedo, Component Broker, and MQSeries are used.

Licensing is based on the number of registered user connections made from the Internet and/or intranet. Connections made through other products that act as connection concentrators must be counted as DB2 Connect users.

DB2 Connect Enterprise Edition is included in the DB2 UDB Enterprise Edition and DB2 UDB Enterprise-Extended Edition. This edition of DB2 Connect is packaged with the following products:

- DB2 Connect Enterprise Edition
- Application Development Client
- Administration Client
- Run-Time Client
- WebSphere Studio Site Developer

DB2 UDB Connect Unlimited Edition

DB2 Connect Unlimited Edition is a unique package that allows complete flexibility of DB2 Connect deployment and simplifies product selection and licensing. This product contains both DB2 Connect Personal Edition and DB2 Connect Enterprise Edition with license terms and conditions that allow the unlimited deployment of any DB2 Connect product. License charges are based on the size of the S/390 or zSeries server that DB2 Connect users will be working with.

This package offering is only available for OS/390 and z/OS systems. Licensing covers VSE/VM and OS/390 customers by including the connection to one DB2 server for VSE and VM database server in addition to one DB2 UDB server for OS/390 and z/OS. Where the host system is part of a sysplex, service units in millions (MSUs) are based on the DB2 entitlements of the entire sysplex.

This edition of DB2 Connect is packaged with the following products:

- DB2 Connect Unlimited Edition
- Application Development Client
- Administration Client
- Run-Time Client
- WebSphere Studio Site Developer
- WebSphere MQSeries

DB2 UDB Connect Personal Edition

DB2 Connect Personal Edition provides access from a single workstation to DB2 databases residing on servers such as OS/390, z/OS, OS/400, VM, and VSE, as well as to DB2 UDB servers on UNIX and Windows operating systems. DB2 Connect Personal Edition provides the same rich set of APIs as DB2 Connect Enterprise Edition. This product is currently available for Linux and Windows operating systems.

DB2 Connect Personal Edition is used to connect a single Windows operating system, or Linux workstation, to a host or iSeries database. DB2 Connect Personal Edition is best suited for environments in which native TCP/IP support is provided by the database servers, and the application being deployed is a traditional two-tier client-server application.

For example, DB2 Connect Personal Edition is a good choice for enabling traditional two-tier Visual Basic and Microsoft Access applications. Applications that require a midtier application server need to use DB2 Connect Enterprise Edition.

This edition of DB2 Connect is packaged with the following products:

- DB2 Connect Personal Edition (single connection)
- Application Development Client
- Administration Client
- Run-Time Client

DB2 UDB Connect Application Server Edition

The DB2 Connect Application Server Edition product is identical to the DB2 Connect Enterprise Server in its technology. Just like the DB2 Connect Enterprise Edition, it is designed for large-scale demanding environments. However, its licensing terms and conditions are meant to address specific needs of multitier client-server applications as well as applications that utilize Web technologies.

The DB2 Connect Application Server Edition license schema is based on the number of processors available to the application servers where the application is running. Licenses are not affected by the number of users of the application, size of the DB2 Connect server itself, or the size of the mainframe database server.

The DB2 Connect Application Server Edition comes packaged with the following products:

- DB2 Connect Application Server Edition
- DB2 Application Development Client
- DB2 Administration Client
- DB2 Run-Time Client
- WebSphere Studio Site Developer
- WebSphere MQSeries

The supported server platforms are Windows NT, Windows 2000, AIX, HP-UX (32 and 64 bit), Solaris (32 and 64 bit), Linux, Linux/390.

The supported client platforms are Windows 98, Windows ME, Windows XP (32-bit) Home Edition and Professional Edition, Windows NT, Windows 2000, AIX, HP-UX (32 and 64 bit), Solaris (32 and 64 bit), Linux, and Linux 390.

DB2 UDB Clients

DB2 clients are used to connect to backend database servers running on other systems (see Figure 1.5). DB2 clients cannot connect to host databases without using DB2 Connect or DB2 ESE as a gateway.

DB2 clients can connect to DB2 servers *two* releases later or *one* release earlier than the client's release level, as well as to servers at the same release level. This means that a DB2 Version 6 client can connect to DB2 servers at versions 5, 6, 7, and 8.

NOTE
A database cannot be created on a DB2 client. You must access databases that reside on a DB2 server.

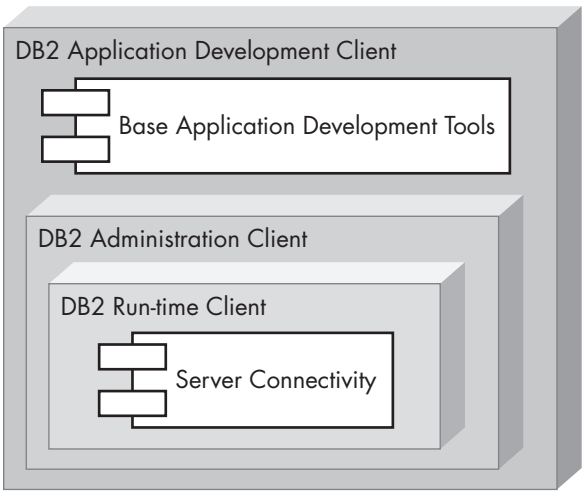

Figure 1.5
DB2 UDB client components.

DB2 Run-Time Client

The DB2 Run-Time Client is a light-weight client that provides the function required for your application to access DB2 UDB servers and DB2 Connect servers. Function includes communication protocol support and support for application interfaces such as JDBC, SQLJ, ODBC, CLI, and OLE DB. As a result of the removal of most of the previous Run-Time Client GUI facilities, the Version 8 Run-Time Client now has diminished disk requirements.

NEW
The Configuration Assistant (CA) and the Command Center are no longer packaged with the Windows Run-Time Client. To administer the DB2 UDB Run-Time Client, the CLI/ODBC administration GUI and the Command Line processor can be used, which are still packaged with the Version 8 Run-time Client.

DB2 Run-Time Clients are available for the following platforms: AIX, HP-UX, Linux, the Solaris Operating Environment, and Windows operating systems.

DB2 Administration Client

A DB2 Administration Client provides the ability for workstations from a variety of platforms to access and administer DB2 databases. The DB2 Administration Client has all the features of the DB2 Run-Time Client and also includes all the DB2 administration tools and support for Thin Clients. DB2 Administration Clients are available for the following platforms: AIX, HP-UX, Linux, the Solaris Operating Environment, and Windows operating systems.

DB2 Application Development Client

The DB2 Application Development Client is a collection of graphical and non-graphical tools and components for developing character-based, multimedia, and object-oriented applications. Special features include the Development Center and sample applications for all supported programming languages. The Application Development Client also includes the tools and components provided as part of the DB2 Administration Client product. DB2 Application Development clients are available for the following platforms: AIX, HP-UX, Linux, the Solaris Operating Environment, and Windows operating systems.

DB2 Data Warehouse Concepts

Your organization may contain data in a variety of logical and physical DB2 servers. Each business unit may have their own database(s) containing vital information such as sales, inventory, and other forms of operational data. The largest business units may use DB2 for z-Series as their backend database server, while medium-sized units employ DB2 for AIX or DB2 for i-Series. Furthermore, if your organization employs decentralized or siloed information management,

similar operational data for different business units may be stored in tables with different names and formats. This is also common when an organization grows by acquiring other companies, thereby inheriting new data architectures along the way.

In order to effectively manage your organization, business analysis on operational data across your enterprise is critical. What if you lost millions in sales because you had ten global sales offices selling widgets, each with its own sales database, all sharing the same inventory database. Suddenly everyone in North America starts buying widgets and you run out of inventory and production cannot supply the demand for all the new orders.

It may not be possible to have business analysts monitoring several database servers, each requiring a considerable level of expertise to access, or which are unavailable for performing business analysis because of the load generated by daily transaction processing. A data warehouse can offer a solution.

A data warehouse contains stores of informational data, taken primarily from operational data sources. Informational data is not used for analysis rather than for transactional or operational processing. There are three steps required to create a data warehouse.

- Extraction of data from operational or other informational data sources.
- Transformation of data into the data structures defined by the data warehouse.
- Loading data into the data warehouse.

The DB2 Warehouse Manager toolkit provides this functionality. When initializing the data warehouse, DB2 Data Warehouse Center also creates a control database. This is used to store information such as the permissions required to access data from various data sources.

DB2 OLAP Starter Kit Concepts

The DB2 OLAP Server Starter Kit is a scalable, industrial-strength Online Analytical Processing (OLAP) software that enables you to build sophisticated decision support, planning, and analysis applications for your enterprise. DB2 OLAP Server Starter Kit provides a fast path to turn your warehouse data into business insight. It delivers "speed of thought" query performance to a large set of online users. It is built for e-business with tools to help you quickly deploy Web-based analytical applications. Using the DB2 OLAP Server, you can store data in relational and multi-dimensional formats, where in the latter format data is visualized in terms of an OLAP cube.

DB2 Relational Extenders

DB2 Relational Extenders are used to extend the performance and functionality of DB2 Servers when working with different media types. This includes text documents, audio clips, images, and video clips. The DB2 Extenders Family is composed of several products. This includes Text Extender; Audio, Image, and Video (AIV) Extenders; XML Extender; and Spatial Extender. The platform availability varies for each DB2 Extender product. All products are available on most Unix and Intel platforms. Some DB2 Extender products are also available on z-Series.

Table 1.1 DB2 Relational Extender products and functionality

Extender Product	Functionality
Text Extender	Creates indexes of textual data stored in a DB2 Server to allow for high-performance searching.
Audio, Image, and Video Extender	Assists with managing media data, and provides useful functionality such as being able to search media types by content.
XML Extender	Maps XML documents to and from a DB2 relational database.
Spatial Extender	Allows for integrated storage and access of spatial and business data.

DB2 EVERYPLACE

DB2 Everyplace is a tiny "fingerprint" database of about 100K. It is designed for low-cost, low-power, small form-factor devices such as personal digital assistants (PDAs), handheld personal computers (HPCs), or embedded devices. DB2 Everyplace runs on devices that use the Palm Computing® Platform, Windows CE, the EPOC operating system, and the QNX Neutrino. DB2 Everyplace provides a local data store on the mobile or embedded device for storing relational data from elsewhere in the enterprise. Relational data can be synchronized to the handheld device from other DB2 data sources such as DB2 UDB for UNIX, Windows, z-Series, and i-Series.

DB2 Everyplace with IBM Mobile Connect will also synchronize data from other ODBC-compliant data sources such as Oracle and Microsoft. The DB2 Everyplace Sync Server mobilizes professionals with e-business information anywhere, anytime. It extends the power of DB2 to a wide range of handheld devices, such as those running the Palm Pilot.

The DB2 Everyplace Personal Application Builder supports building applications for small handheld devices that access DB2 Everyplace databases. Some of its capabilities include:

- Support for visual construction of forms for different devices.
- Support for the lightweight DB2 Everywhere database on the device.
- Scripting capabilities for user-defined logic.
- Integration with other tools for application testing and debugging.

SUMMARY

In this chapter, the DB2 UDB v8 family was introduced. The products discussed were the following:

- DB2 UDB Server Products
- DB2 UDB Personal Edition
- DB2 UDB Developer's Products
- DB2 UDB Connect Products
- DB2 UDB Clients

The above products do not constitute the complete DB2 UDB v8 family. The intention of this chapter was to cover the minimum required for the Fundamentals of DB2 (Exam 700). For a complete coverage of DB2 UDB v8 products, please refer to the online DB2 UDB manuals at the following URL:

www-3.ibm.com/cgi-bin/db2www/data/db2/udb/winos2unix/support/v8pubs.d2w/en_main