CHAPTER 2

Getting Started

In this chapter, you will learn:

- How to install DB2 Express server and client
- How to create the DB2 SAMPLE database
- How to work with databases using the DB2 Control Center and Command Editor
- How to create your own database to be used for developing this book's sample application
- How to find information using the DB2 Information Center

2.1 Introduction

This chapter guides you through the process of installing DB2 and gives you a brief introduction to the graphical tools that accompany the product. In the process, you will learn how to create two databases. The first database, called SAMPLE, is shipped with DB2 and has a few simple tables and sample data. The second database, L8NITE, will be used for developing the application described in this book. The L8NITE database will be refined and tuned to demonstrate DB2 application development, deployment, and maintenance best practices.

To interact with the database, two important graphical tools will be introduced: the DB2 Control Center and the Command Editor.

The DB2 Control Center is DB2's primary graphical tool for database administration. The Command Editor is a graphical interface for executing DB2 commands or SQL. Other tools are provided with DB2, and they will be introduced as needed in later chapters.

2.2 Installing DB2 Express

A time limited trial edition of DB2 Express v8.2 can be downloaded from the IBM Web site at http://www.ibm.com/software/data/db2/udb/db2express/. A unlimited evaluation version of DB2 Express (and license) is available by registering at the IBM Virtual Innovation Center:

http://www.developer.ibm.com/welcome/vic.html

You can apply a license to a trial product at any time without having to reinstall DB2. Once you have the license file, use the DB2 License Center (which can be launched from the Tools menu of the Control Center) to register it.

Inquiring Minds: Virtual Innovation Center

The Virtual Innovation Center provides complimentary resources that enable mid-market Business Partners to build technical, sales, and product skills with IBM software products early in the product life cycle. By registering your company, you can get complimentary IBM software for development, get technical assistance via e-mail or chat, access online IBM education courses, and access sales and marketing materials.

A unlimited evaluation version of DB2 Personal Developer's Edition can also be downloaded from the IBM DB2 DeveloperWorks Web site at

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

Before you install, verify that your system meets the minimum requirements for DB2 Express v8.2 outlined in Table 2.1.

Table 2.1 Minimum System Requirements for DB2 Express

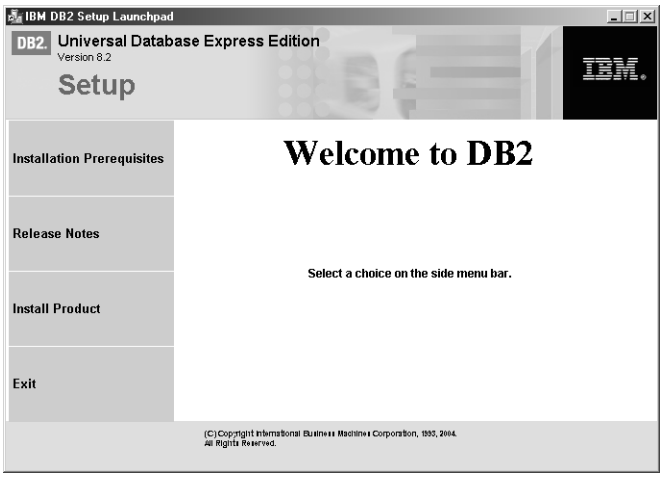
Hardware	For DB2 products running on Intel systems, a Pentium or later CPU; for AMD systems, an AMD Athlon CPU
Operating System	Windows 2003, Windows 2000, Windows NT, Windows XP, Linux Linux Distributions: For the latest information on supported distributions and kernel levels, see http://www-306.ibm.com/software/data/db2/linux/validate/

Note: DB2 servers are not supported on Windows XP Home Edition because of differences in how user authentication is handled. DB2 clients and DB2 Personal Edition, however, are supported on Home Edition.

Before starting the installation, log in to your system using a local administrator account or as the root user (on Linux). Then follow these steps:

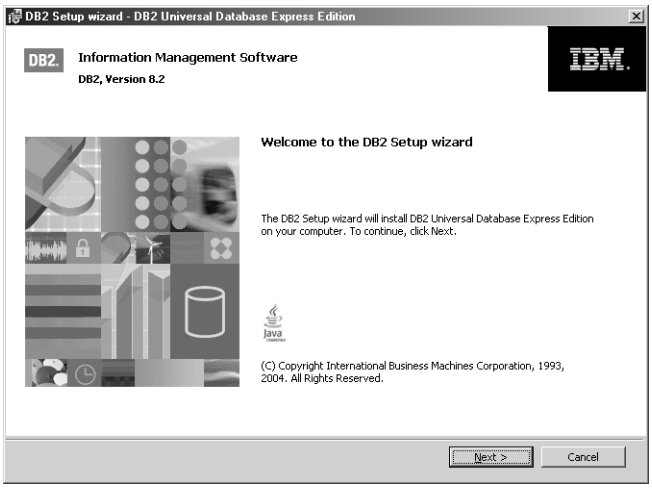
1. Setup Launchpad. Installing DB2 Express is straightforward. Execute setup.exe and the IBM DB2 Setup Launchpad will automatically appear, as illustrated in Figure 2.1. From the launchpad, select the Install Product option to launch the Setup wizard.

Figure 2.1 Starting the installation



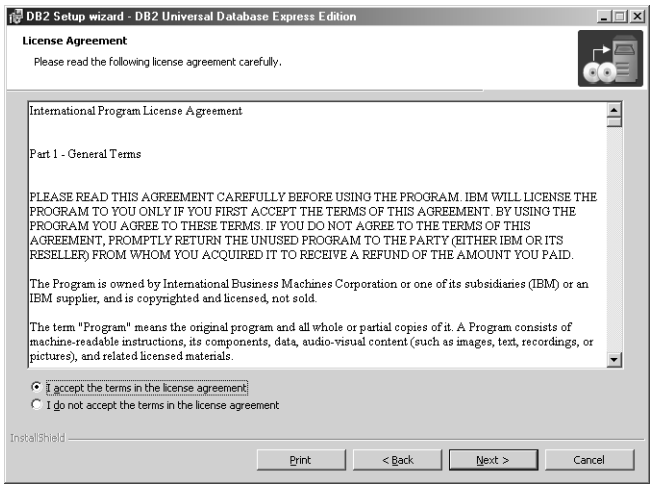
2. Setup wizard. The Setup wizard (Figure 2.2) will check your system for existing DB2 installations and minimum system requirements (this may take a few minutes). When the search is complete, the first of the installation screens will be displayed. To continue with the installation, click Next.

Figure 2.2 Setup wizard



3. License Agreement. On this screen, you will be asked to accept the product licensing agreement (see Figure 2.3). To continue with the installation you will need to accept the terms and click Next.

Figure 2.3 License agreement screen

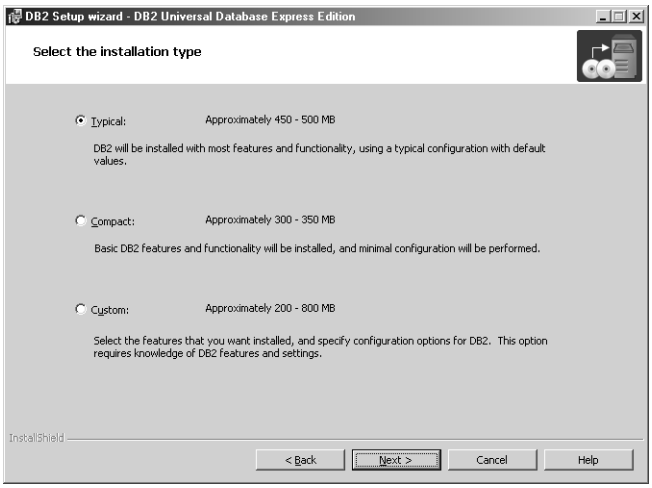


4. Installation Type. Using this screen you can choose from three installation options (see Figure 2.4).

- Typical: Install the most commonly used DB2 options.
- Compact: Perform only a basic installation.
- Custom: Select the specific features you want to install.

For the purposes of this book, select the Typical installation option.

Figure 2.4 Installation type

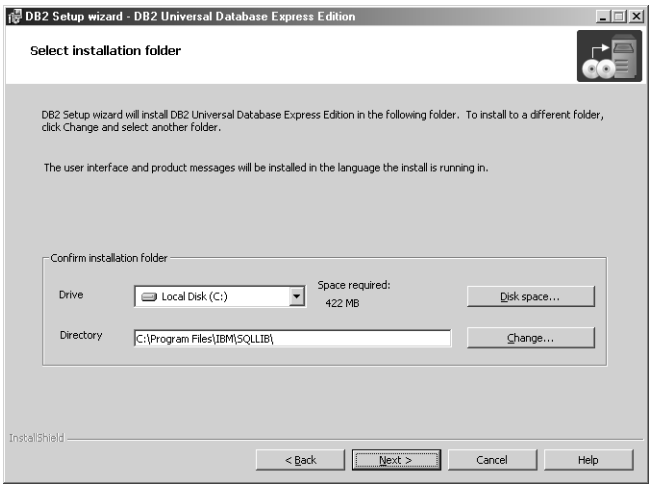


5. Select installation folder. Use this screen to specify the DB2 installation directory (see Figure 2.5). Ensure that you have enough free disk space as prescribed by the Typical installation. Click Next to move to the next screen.

If possible, we recommend using the default installation location:

C:\Program Files\IBM\SQLLIB

Figure 2.5 Installation folder



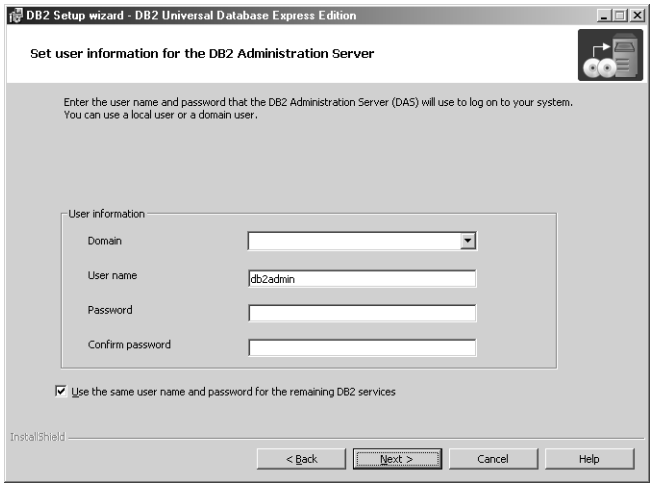
6. Set user information. When DB2 is installed, a set of DB2 processes is run as system services. These system services need to log in to the operating system before they can run.

On Windows, the default user ID db2admin is suggested (see Figure 2.6). On Linux, the default user ID db2inst1 is suggested. As for passwords, we use ibmdb2 for this book, but you can use whatever you like.

If the specified user does not already exist, it will be created automatically and granted local administrator privileges (therefore, be sure to protect this user ID). If you want to provide an existing user ID and password, the user must have local administrator authority.

Chapter 11, Implementing Security, shows you how to change user authentication information for DB2 services.

Figure 2.6 User information

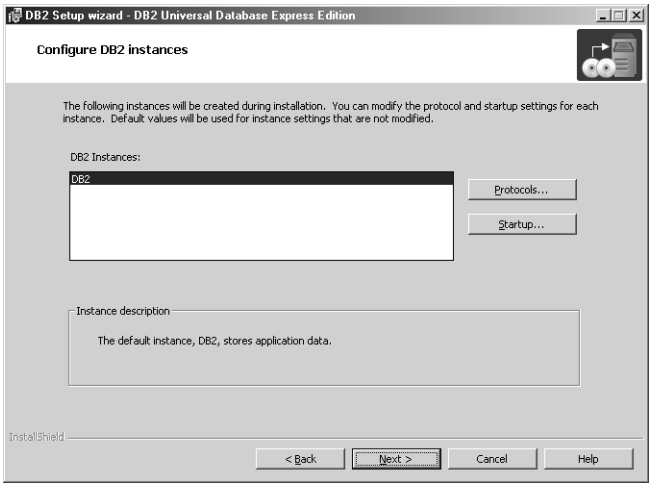


7. Configure DB2 instance. A DB2 *instance* is best thought of as a container for databases. An instance must exist before you create a database. During installation, a default instance called DB2 will be created so that you can create a database immediately after installation completes (see Figure 2.7).

Note: Often, there is confusion caused by the fact that both the product and the default instance name (on Windows) are called DB2. To be clear, the instance name and the product name are two separate entities and do not have any strict association. On Linux and UNIX environments, for example, the default instance is called db2inst1 rather than DB2.

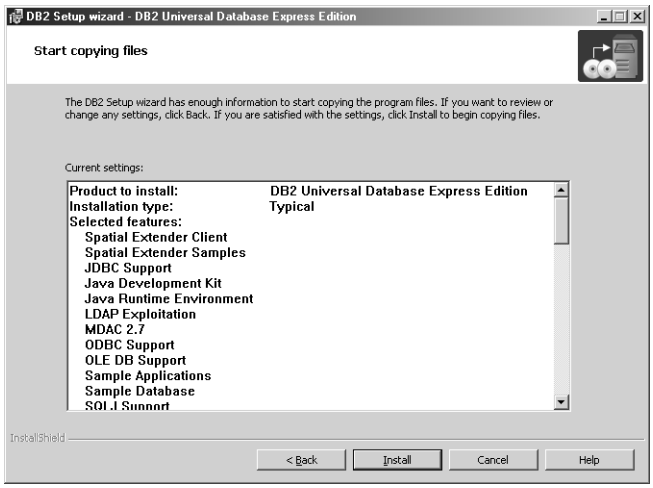
By default, the DB2 server is configured to use Transmission Control Protocol/Internet Protocol (TCP/IP) as the communications method on port 50000 to listen for incoming remote connections. You can click the Protocols button to change this setting. However, unless you know that port 50000 is already being used by some other service (generally a rare event), there is no need to change this setting.

Figure 2.7 Configure DB2 instances



8. Start copying files. This screen will display a summary of the installation options (Figure 2.8). Review the selections before clicking the Install button to start the installation process.

Figure 2.8 Start installation



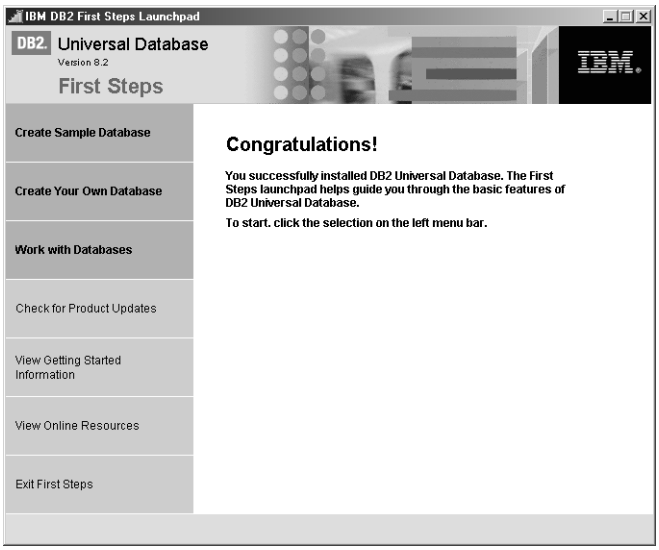
Note: The installation process for Linux is largely the same as for Windows. One difference is that, for security reasons, you will be prompted to provide a separate user ID for the instance owner and the fenced user. The fenced user ID will be used to run external (e.g., C or Java) stored procedures and user-defined functions.

Tip: Chapter 11 provides more information about how to simplify security on Windows by using the Local System account.

2.3 First Steps

After the installation is complete, a launchpad called First Steps is displayed (Figure 2.9). The First Steps launchpad offers you quick access to information to help get you started.

Figure 2.9 DB2 First Steps Launchpad



The First Steps page can help you create a sample database, called SAMPLE, that is shipped with DB2. Click the Create Sample Database task at the top of the page. While the database is being created a progress indicator will be shown. You will use this database later in this chapter.

2.4 DB2 Graphical Tools

DB2 Express includes an easy-to-use suite of tools to help you manage your database without having to learn the DB2 command-line environment. Over the course of this book you will see more of the capabilities of these graphical tools. This section gives you an initial look at two of these tools—the DB2 Control Center and the Command Editor—and explains what you can do with them.

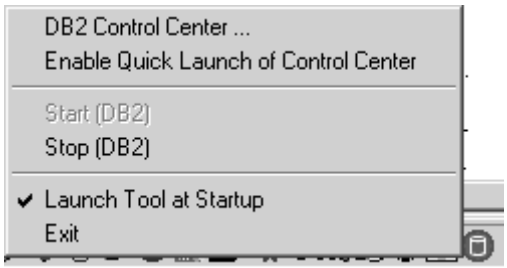
The DB2 Control Center is used to administer DB2. Using the Control Center you can create, modify, and manage databases and their associated objects (tables, indexes, etc.) as well as launch many other tools to guide you through a vast array of tasks and activities.

The Control Center can be launched in a number of ways:

- From the Windows Start menu entry, as illustrated in Figure 2.10
- From the DB2 icon in the Windows system tray, shown in Figure 2.11
- By executing db2cc on a command prompt
- By clicking on the Control Center icon in the toolbar of any of the other DB2 tools

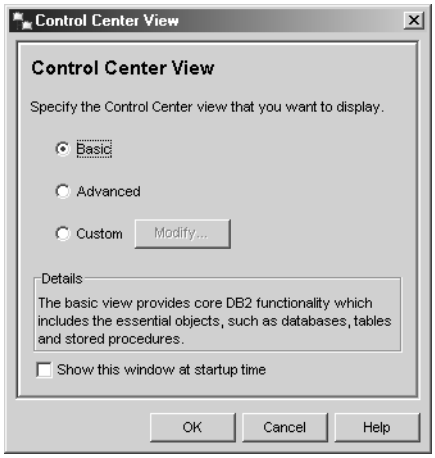
Figure 2.10 Launching the Control Center in Windows

Figure 2.11 Launching the Control Center from the system tray



The first time the Control Center loads, you will see the Customize dialog (Figure 2.12) asking you which Control Center view you would like to use. The Control Center is a single point of access to a vast array of functionality. Exposing all the options and advanced features to new users, however, can be a bit overwhelming. Therefore, unless you have prior experience with DB2, we recommend that you select the Basic view, which will display only the essential database objects and features (as opposed to the default Advanced view setting).

Figure 2.12 Control Center View dialog

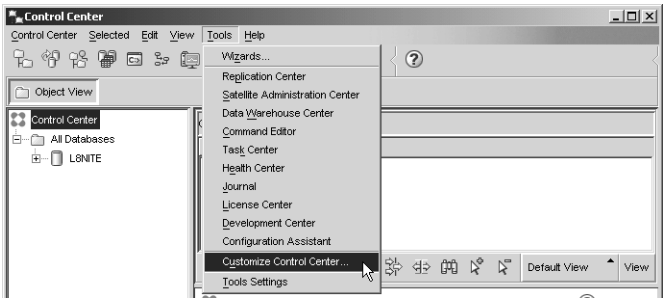


Note: We have also deselected the check box in the lower-left corner so that this dialog is not automatically displayed the next time the Control Center is launched.

After a view has been selected, the Control Center will continue to use that setting until you reinvoke the dialog and change it. When you have more experience with the Control Center, you can further customize it to show only those items and features you need.

If you choose the Advanced view, all available folders, objects, features, and functions will be displayed. The Custom view allows you to configure a customized view of the Control Center that shows only what you want to see. By clicking the Modify button, you can hide or show folders, objects, and their associated context menu items.

Figure 2.13 Relaunching the Customize dialog

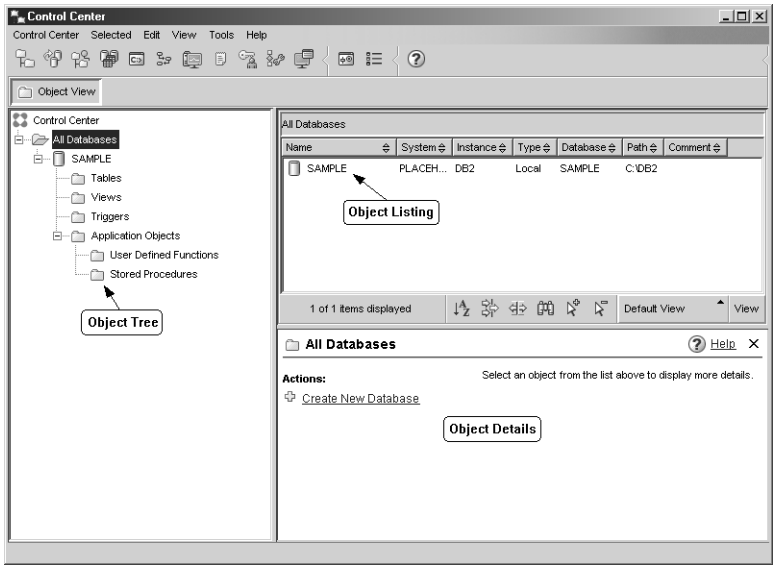


If you want to reinvoke the Control Center View dialog, select the Customize Control Center option (Figure 2.13) from the Tools menu. Or you can click on the Customize Control Center link in the object details panel when the root of the object tree (labeled “Control Center”) is selected.

No matter which Control Center view is selected, the main interface will be laid out in three main sections (Figure 2.14):

- Left frame, object tree
- Upper-right frame, object listing
- Lower-right frame, object details

Figure 2.14 Control Center layout



Selecting a folder from the object tree will display the contents of the folder in the object listings frame. The object details frame will show more detailed information for the selected object and will provide links to perform common tasks associated with the selected object.

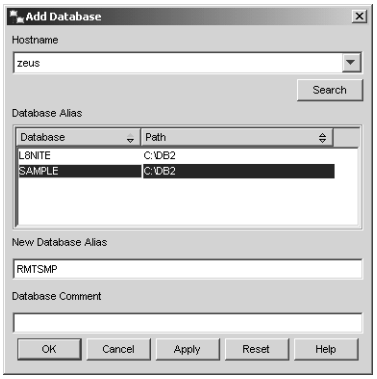
The object tree is not expanded when the Control Center first loads. When expanded, it shows a list of all the databases registered on the client. By expanding the All Databases folder, you will see the SAMPLE database created in the previous section.

Inquiring Minds: Adding an Existing or Remote Database

If you have an existing database (possibly on another machine) and want to connect to it, it must first be registered with the DB2 client. To do this, right-click on the All Databases folder and select Add from the pop-up menu. The Add Database dialog

(Figure 2.15) can be used to search the local machine or network to catalog databases on the client.

Figure 2.15 Add Database dialog



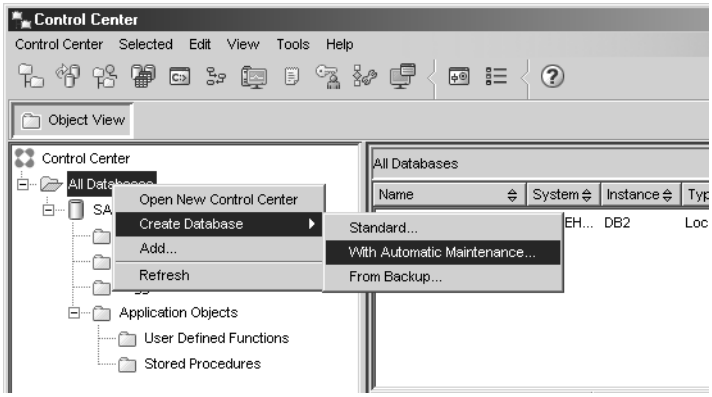
Note that database names are currently limited to eight characters and must be unique on each client. If the name of a database on a remote machine matches one that exists on your local machine, you need to alias it. In Figure 2.15, the SAMPLE database on a remote host called ZEUS is being aliased as RMTSMP.

2.5 Creating a Database

In subsequent chapters, you will build an application against a database called L8NITE.

From the Control Center, right-click the All Databases folder and select Create > With Automatic Maintenance (Figure 2.16).

Figure 2.16 Launching the Create Database wizard



This will launch a wizard that creates and preconfigures a database to get you started. Follow these steps:

Step 1: Specify the database name and location.

Complete the following fields:

- **Database name:** L8NITE
- **Default drive:** C: (select a drive that has sufficient disk space)
- **Alias:** This will default to L8NITE if left blank.
- **Comment:** This is optional and can be left blank.

Click Next to continue.

Step 2: Configure the Maintenance Window.

The second step asks whether you can specify a period of time when DB2 can do some offline maintenance activities. Assuming that your database will not be used 24/7 we recommend you select Yes and click Next. If you don't want to specify a maintenance window, DB2 will still be able to do some online maintenance activities.

Step 3: Specify automatic offline maintenance timing.

The third step of the wizard (Timing) is available if you answered Yes to step 2. Set aside two or more hours a week when DB2 can perform automated tasks to ensure the health of your database.

Click Next to continue.

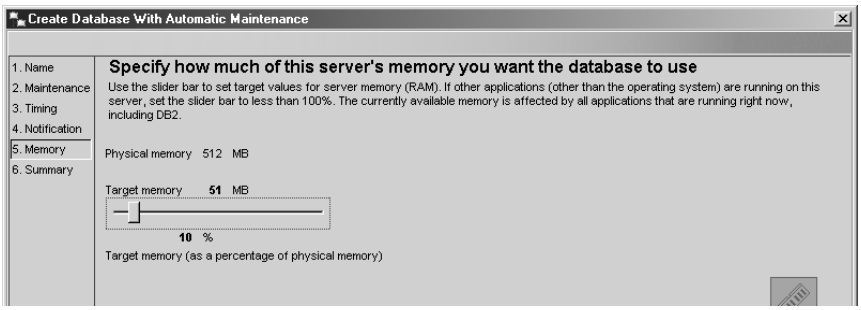
Step 4: Configure notification.

DB2 can automatically send you an e-mail (or send a message to a pager) if a problem or unhealthy condition is detected. If you wish to configure this, click the Add Contact button. Setting up notification can be skipped if you do not want to receive messages from DB2.

Step 5: Configure memory.

DB2 automatically detects how much physical memory is available on your system (Figure 2.17). All you are required to provide is the percentage of memory DB2 can use for tuning itself.

Figure 2.17 Configure memory usage



In making this decision, you should consider which other applications or databases will be running on the same system. Be sure to leave physical memory available for other applications when deciding on this value.

Consider the memory requirements for the following:

- The operating system itself
- Other applications such as Web servers and application servers
- Other databases running on this machine
- Development tools running on the same machine

Therefore, assuming you are installing DB2 on your primary development workstation, we recommend setting this value to a lower value, such as 10% or 20%. Later, in Chapter 10, Performance Tuning, you will see how DB2 can be further tuned. Select the desired memory setting and click Next.

Note: If you are not careful, you can easily overtune your database. If the system tries to use more memory than is physically available, overall system performace may degrade significantly.

Click Finish to start the database creation process. Database creation usually takes a few minutes, during which time a progress indicator will be displayed.

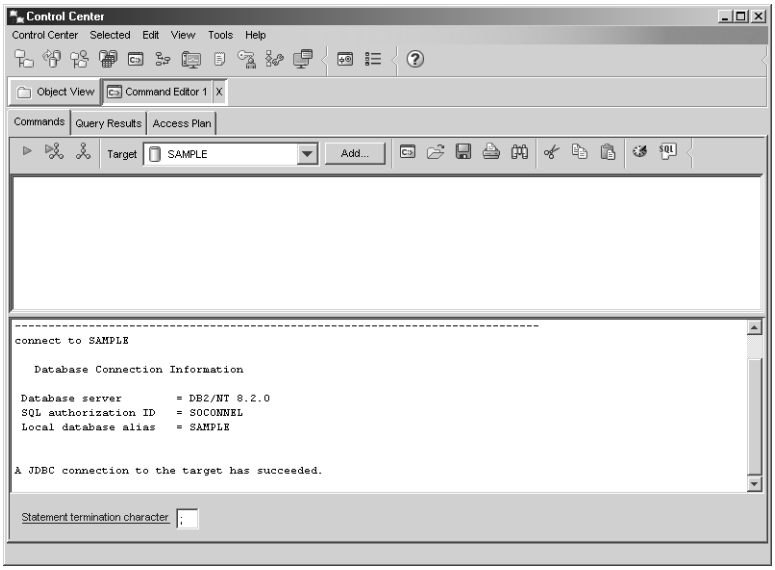
2.6 DB2 Command Editor

Using the Command Editor, you can execute DB2 commands and SQL, analyze the execution plan of an SQL statement, and view and update query result sets. The Command Editor offers some nice features to help you be more productive. For example:

- The built-in SQL Assist tool can help you generate SQL if you are not familiar with SQL syntax.
- A history of executed SQL statements is maintained to save retyping.
- After you execute queries, you can edit the results directly in the table, saving you the effort of writing multiple UPDATE statements.
- To help tune an SQL statement you can use a tool called Visual Explain, which graphically displays how the SQL statement will be executed. For example, Visual Explain can tell you which indexes are being used to access data, the kind of sort operations that are occurring, and the order in which tables are accessed (when multiple tables are referenced).

Within the Control Center, launch the Command Editor by right-clicking on the SAMPLE database (created earlier) and select the Query menu item. This will launch the Command Editor as an embedded tile in the Control Center (Figure 2.18).

Figure 2.18 Embedded Command Editor



When the Command Editor is launched, it displays only an input and an output area. The input area (the top portion of the editor) is where you can submit SQL and CLP (Command Line Processor) commands. Depending on how the Command Editor is launched, a connection may be attempted automatically. After a connection has been established, two more tabs (labeled “Query Results” and “Access Plan”) will appear.

You can return to the Control Center view by clicking on the Object View tile. To close the Command Editor, click the X icon associated with the tile.

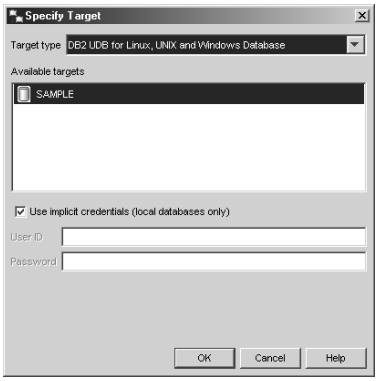
The Command Editor can also be launched in other ways:

- Whenever a queryable object is selected (such as a database, table, or view), you can launch the Command Editor by clicking the Query link in the Control Center’s object details panel.
- You can launch the Command Editor as a stand-alone application from the DB2 command prompt by typing db2ce, from the Control Center toolbar, or from the Windows Start menu.

You can establish a database connection by inheriting one from the Control Center (by launching the embedded Command Editor) or by using the Add button within the Command Editor to add to the list of connections made during this session.

When you press the Add button, a dialog appears (Figure 2.19), where you can select a database to connect to. Using this dialog you can provide specific authentication criteria using the User ID and Password fields. (If the database is local, you can use the implicit credentials option, which means that the Command Editor will reuse the credentials you used to log in to the operating system.)

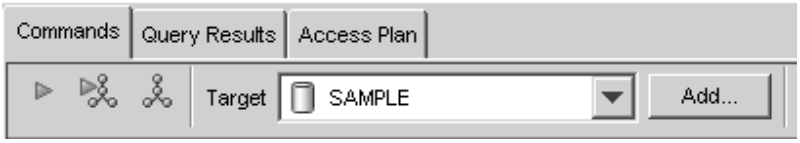
Figure 2.19 Command Editor Add (database connection) dialog



Commands Tab

When a connection is established you can submit commands and queries against the database. First, familiarize yourself with the buttons in the top-left corner of the Commands tab (Figure 2.20).

Figure 2.20 Command Editor controls



- The first button (Execute) runs the command in the input area.
- The second button (Execute and Access Plan) runs the command in the input area and generates an access plan for the query.
- The third button (Access Plan) generates an access plan for a query without executing the query. This is useful when you're troubleshooting a long-running query and you want to know what is happening internally, without actually executing the statement.

Using the SAMPLE database, we will query a table called DEPARTMENT. Type the following SQL statement in the input window.

```
SELECT * FROM DEPARTMENT;
```

Click the single green arrow button to execute the statement. You can also use the shortcut Ctrl+Enter.

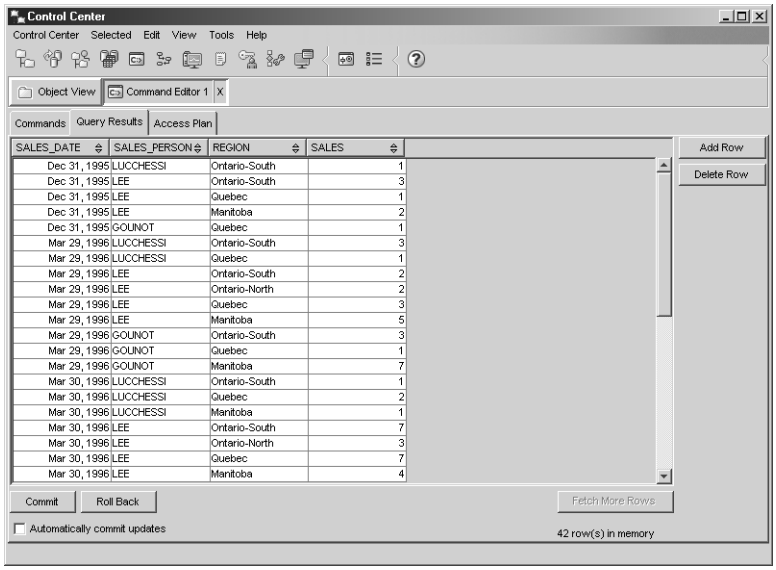
Tip: You can have multiple statements in the input window as long as each statement ends with a termination character. If you press the execute button, the statements will be executed one after another. If you explicitly highlight a particular statement, only the highlighted statement will be executed.

Note: The statement here ends with a semicolon, which is the default statement terminator. You can change the statement terminator by specifying a different termination character at the bottom of each Command Editor window.

Query Results Tab

The Query Results tab (Figure 2.21) can be used to view and edit the results of your query (called the *result set*). That is, you can add, delete, or update rows of data without having to use SQL statements. (This feature is available only when you're executing a single query at a time.) If you execute multiple statements at one time, the results will be displayed in the output window rather than in the Query Results tab.

Figure 2.21 The Query Results tab of the Command Editor



To add data to the Department table, click the Add Row button. To delete a row, select a row from the result set and click the Delete Row button. To modify data in existing rows, click on any cell and directly change the values. The changes you make are not made permanent until you click the Commit button. If you make a mistake, you can undo the changes you've made by clicking the Roll Back button. For convenience, you can also have the Command Editor automatically commit changes as you make them. To do that, select Automatically Commit Updates option.

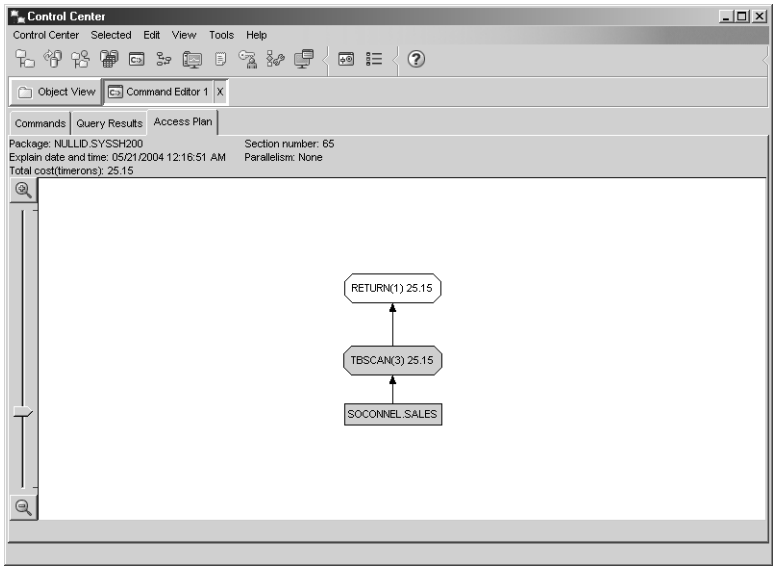
Access Plan Tab

If you are interested in how DB2 is performing a particular SQL statement, you can use DB2's Visual Explain tool to explain the query (called an *access plan*). This tells you, among other things,

- How a table is accessed
- In what order tables are accessed
- Which sorting algorithms are employed, and so on

The access plan for the query is displayed in the Access Plan tab. Return to the Command tab of the Command Editor. This time, instead of clicking the Execute button, click the Access Plan button. Figure 2.22 shows a sample access plan.

Figure 2.22 Viewing access plans in the Command Editor



Visual Explain will be discussed in greater detail in Chapter 10, Performance Tuning.

2.7 DB2 Information Center

No getting-started chapter would be complete without a discussion of where to find more information. For most users, the primary source of official DB2 information will be the DB2 Information Center. Open a browser to

http://publib.boulder.ibm.com/infocenter/db2help/index.jsp

Bookmark this site. It is an invaluable resource that is actively maintained and updated as documentation is improved or when new DB2 features are released.

The left navigation tree organizes information by topic. If you know what you are looking for, the Reference subtree is particularly useful. For example:

- If you were looking for the syntax for any SQL statement, you can look in Reference > SQL > SQL Statements.
- For the latest information on JDBC support in DB2, navigate to Developing > Database applications > Programming applications > Java.
- For Command Line Processor commands, go to Reference > Commands > DB2 Universal Database > Command Line Processor (CLP).

If you’re not quite sure where to look for something, the Search function is a great way to start. All official DB2 documentation is searched, and results are returned with rankings in order of expected relevance.

2.8 Supplemental: Installing DB2 Clients from a Server CD

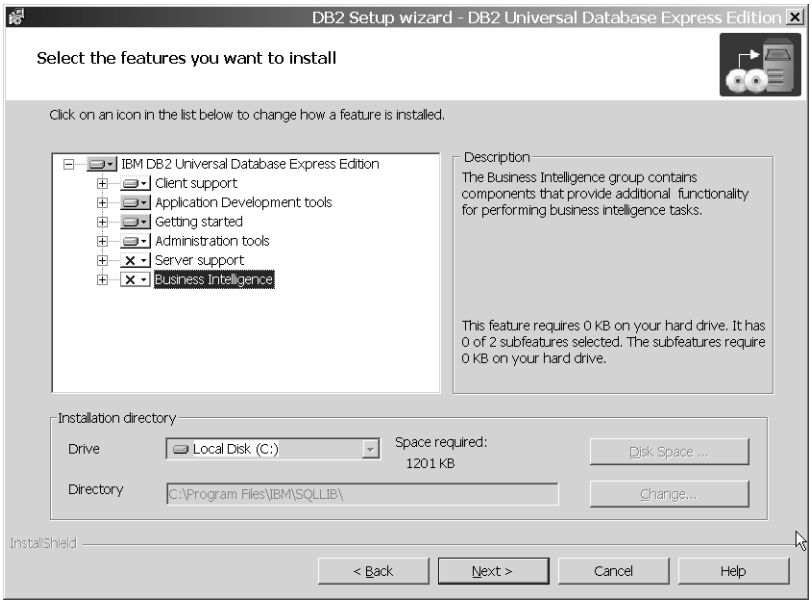
In general, a DB2 client must be installed in order to communicate with a DB2 server (JDBC type 4 connections are the exception). DB2 uses a client/server architecture, even when interacting with a local database. When the database server runs on a separate physical machine from the application client, you may need to install the DB2 client software. A DB2 client comes in three forms:

- DB2 Runtime client: an installable image of the bare minimum client, providing no graphical administration or development tools
- DB2 Administration client: an installable image of the Runtime client and administration utilities
- DB2 Application Development client: an installable image of the Runtime client with application development tools.

DB2 client software can be installed from any DB2 Server CD (using a custom install) or can be download for free from http://www.software.ibm.com/data/db2/udb/support.html.

To install client software from a DB2 Server CD, use a custom installation and deselect the Server Support option, as illustrated in Figure 2.23. If you need only the basic DB2 Runtime client, deselect Application Development Tools and Administration Tools.

Figure 2.23 Using custom installation to install only a DB2 client



2.9 Summary

In this chapter, you got up and running with DB2 by installing the software, creating the SAMPLE database, and using the DB2 Control Center to create your own database called L8NITE which will be used later to develop an application. The Command Editor was also introduced, and you learned how to query a database table, modify its contents, and view access plans for a query. Finally, we introduced you to the DB2 Information Center, an online repository of constantly updated information on DB2.

In Chapter 3, you will prepare for developing the L8NITE sample application by overviewing the application's purpose and functionality.