Beginning Database-Driven Application Development in Java™ EE: Using GlassFish™

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CHAPTER 1

Setting Up Your Working Environment

This chapter provides a quick guide to setting up the software components required to follow the samples provided in this book. In particular, it covers how to obtain, install, test, and prepare for using the following pieces of software:

- The GlassFish application server
- The NetBeans IDE
- Oracle Database XE
- MySQL

Note The book assumes you have installed either Oracle Database or MySQL, or both. If you decide on Oracle, you can actually choose any version of Oracle Database. This chapter, though, discusses how to install Oracle Database Express Edition (XE), a lightweight, easy-to-use, free edition of Oracle Database.

It is interesting to note that each of these software components can be downloaded and used for free. The following sections will give you all the information required to quickly set up these components on your system.

Setting Up the GlassFish Application Server

This section explains how to set up the GlassFish application server on your computer. Then, Chapter 2 will give you a good overview of that application server and discuss how you can quickly get started with it. Also, you might want to check out the "GlassFish Quick Start Guide" document available at `https://glassfish.dev.java.net/downloads/quickstart/index.html`.

Obtaining GlassFish

You can download the latest version of the GlassFish application server from the GlassFish Community web site. As a starting point, you can visit the GlassFish Community home page at

`https://glassfish.dev.java.net/`. At the top-right corner of this page, you should see a set of Download Now buttons, each of which is related to a certain release of GlassFish, as well as the button related to the latest release of TopLink Essentials.

■ **Note** In fact, the GlassFish bundle includes the TopLink Essentials implementation of the Java Persistence API by default. So, you don't need to download it separately. This book assumes you will use the TopLink Essentials bundled with GlassFish. For further information, you can refer to the "JPA Implementation at GlassFish" section in Chapter 3. Also, you can visit the TopLink Essentials page at `https://glassfish.dev.java.net/javaee5/persistence/index.html`.

The `https://glassfish.dev.java.net/` page looks like Figure 1-1.

Figure 1-1. *GlassFish Community home page*

On the GlassFish Community home page shown in Figure 1-1, you can click the top Download Now button to move on to the download page of the most up-to-date stable release of GlassFish. The download page offers binary builds for different platforms. Choose what you need, and start downloading.

Installing GlassFish

Once you have downloaded the GlassFish bundle, you can proceed to the installation. Before you can do this, though, you need to have JDK 5 or JDK 6 installed on your computer.

■ **Tip** If you still have not installed the JDK on your computer or have an older version of it, you should pick up a recent JDK package at Sun's web site and install it on your system. You can download JDK 5 from `http://java.sun.com/javase/downloads/index_jdk5.jsp` and JDK 6 from `http://java.sun.com/javase/downloads/index.jsp`. Once you have installed the JDK, make sure to set the `JAVA_HOME` environment variable to it.

After you download the GlassFish bundle, follow these steps to unbundle and configure the application server:

1. In the command-line console, change the directory to the one where you have saved the GlassFish bundle file, and run the following command to unbundle it:

   ```
   # java -Xmx256m -jar glassfish-installer-xx-xxxx.jar
   ```

2. Scroll down the License Agreement window that appears and then click Accept to accept the license agreement terms and proceed with the installation. You should see a lot of text running on the screen and finally the following:

   ```
   Installation complete
   ```

   In fact, the command in step 1 simply creates the `glassfish` directory and unpacks the bundle to it. Although it says the installation is complete, you still have to run an Ant script to complete the installation.

3. Change the directory to the newly created `glassfish` directory:

   ```
   # cd glassfish
   ```

4. Before you run Ant to complete the installation, make sure that ports 8080 and 8181 are not already in use on your system. If this is the case, edit the following lines in the `setup.xml` file located within the `glassfish` directory:

   ```
   <property name="instance.port" value="8080"/>
   <property name="https.port" value="8181"/>
   ```

   so that they refer to other ports, say, as follows:

   ```
   <property name="instance.port" value="2118"/>
   <property name="https.port" value="8183"/>
   ```

5. Run Ant to complete the installation. The following command assumes you are using Ant bundled with GlassFish. On Windows, issue the following command:

   ```
   # lib\ant\bin\ant -f setup.xml
   ```

On a Unix-like system, issue this:

```
# chmod -R +x lib/ant/bin
# lib/ant/bin/ant -f setup.xml
```

After the Ant build script has completed, you should see the following message at the bottom of the terminal:

```
BUILD SUCCESSFUL
Total time: 48 seconds
```

6. Once the build is completed, read the information in the terminal carefully. Pay close attention to the lines under the `create.domain` section, which tell you what ports will be used with the default GlassFish domain.

■ **Note** GlassFish domains are covered in more detail in the section "Understanding GlassFish Domains" in Chapter 2.

After you've completed the previous steps successfully, you have GlassFish installed on your system and can start using it.

Testing the GlassFish Installation

Now that you have GlassFish installed on your system, it is time to verify your installation. To do this, you can follow these steps:

1. Change the directory to the `glassfish\bin` directory:

   ```
   # cd glassfish_install_dir\glassfish\bin
   ```

2. Run the following command to start GlassFish:

   ```
   # asadmin start-domain domain1
   ```

3. To make sure your GlassFish application server is up and running, enter the following URL in your browser:

   ```
   http://localhost:8080
   ```

   Note that the port in the previous URL may vary depending on the number specified in the `setup.xml` file during the GlassFish installation.

The previous should output the default GlassFish application server page, which looks like Figure 1-2.

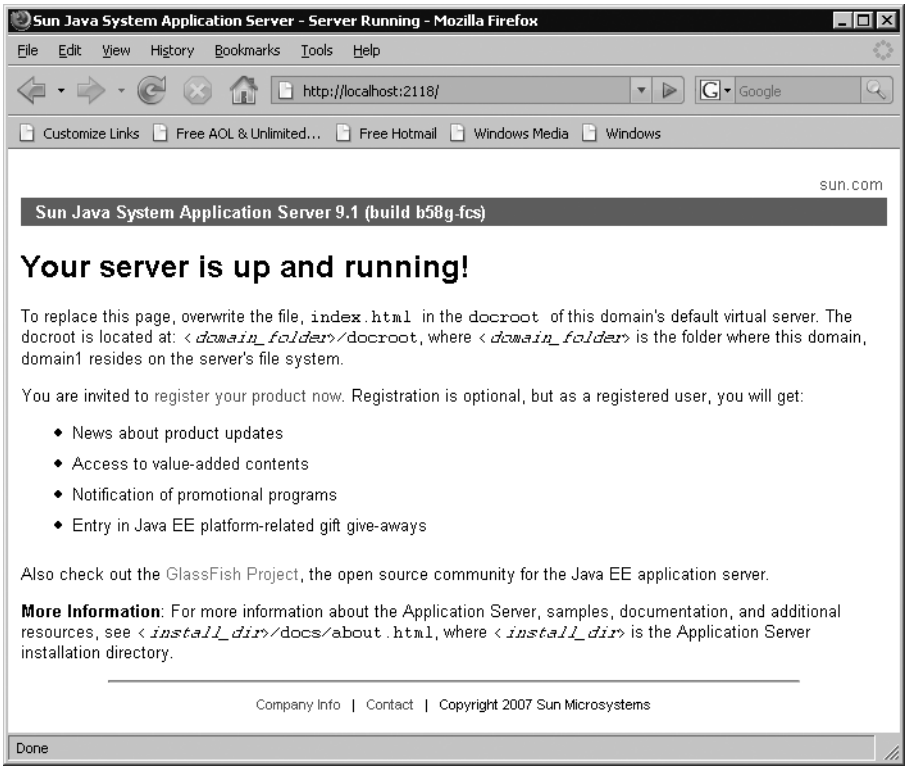

Figure 1-2. *The default GlassFish application server page*

If you see the page shown in Figure 1-2, then your application server is ready for use, meaning you can deploy your applications to it now. That part of deployment is discussed in the "Deploying Applications to the Server" section in Chapter 2.

Testing the GlassFish Admin Console

GlassFish ships with two administrative tools to let you perform administration tasks:

- Admin Console, which is a GUI web interface
- `asadmin`, which is a command-line tool

In the preceding section, you saw how you can use `asadmin` to start an instance of the GlassFish server. Although `asadmin` can be used to perform any administration task on the GlassFish server instances, many developers prefer the web-based Admin Console to it. Before you can test the web-based Admin Console bundled with GlassFish, you need to have GlassFish up and running. If you followed the steps in the preceding section, you should have a running GlassFish server instance now.

To launch Admin Console, enter the following URL in your browser:

```
http://localhost:4848
```

■ **Note** In fact, 4848 is the default port for Admin Console. If you changed it in the `setup.xml` file before installing GlassFish to another one, then you must use the specified port number instead.

Once you've loaded Admin Console, you will be prompted to enter a username/password combination, as shown in Figure 1-3.

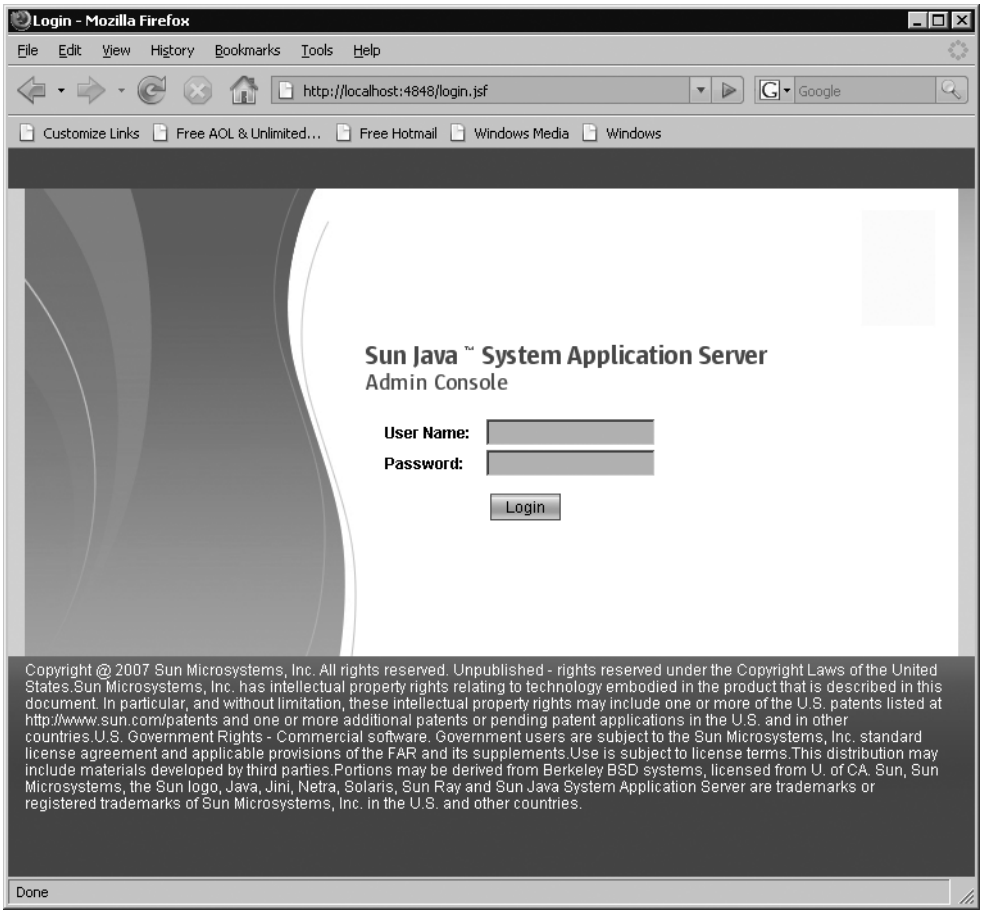

Figure 1-3. *The login page of Admin Console*

To log in to the server, you can use the default username/password pair: `admin/adminadmin`. It is recommended that you change the default administrator password for security reasons. So, your first administration task to perform might be to change the default password of the `admin` user. To achieve this, you can follow these steps:

1. Assuming you are already logged in to the server, click the Application Server node under the Common Task column located on the left side of the Admin Console window.
2. Click the Administrator Password tab. As a result, you should see the screen shown in Figure 1-4.
3. On the Administrator Password tab, type in a new password in the New Password text box and then type in the same password in the Confirm New Password text box.
4. Click the Save button on the right side of the display to replace the old password with the new one.

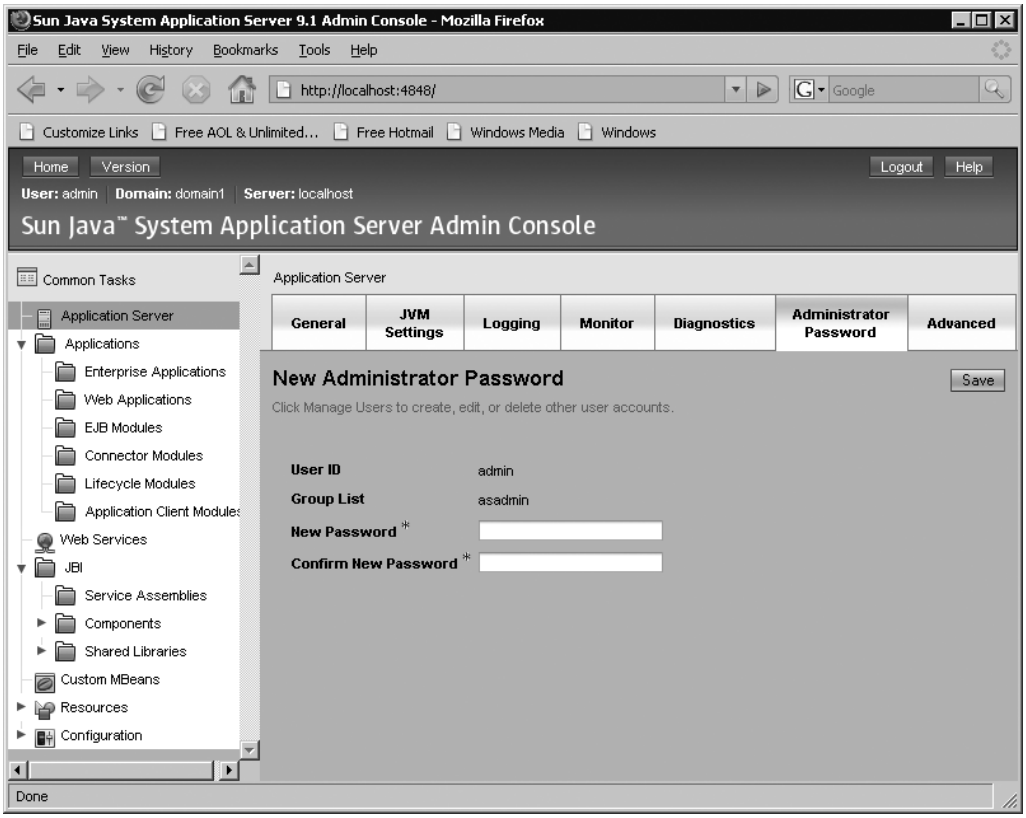

Figure 1-4. *The Administrator Password tab of the Application Server screen in Admin Console*

As you can see in the figure, the Application Server screen in Admin Console includes some other tabs besides Administrator Password discussed here. In the "Configuring the GlassFish Application Server" section in Chapter 2, you will learn how to accomplish major configuration tasks using the menus and buttons located on the Application Server screen's tabs.

■ **Note** Although this section gives you a rough idea of how to use Admin Console, Chapter 2 provides more detailed information on using this browser-based GUI tool, including discussing how you can use it to configure your application server.

Now that you have performed some initial tests of your GlassFish application server, you might want to stop it. To do that, you can execute the following command from a terminal window:

```
# asadmin stop-domain domain1
```

Once you have stopped the server, you cannot manage it with Admin Console anymore—at least, not until you start the server again. In that case, though, you first will be redirected to the login page shown in Figure 1-3 earlier.

As an alternative to stopping the GlassFish application server instance with the `asadmin` command, you could stop the instance through the Admin Console tool. To do this, you should move to the General tab of the Application Server screen and click the Stop Instance button there.

That concludes this concise guide on installing and testing the GlassFish application server and its GUI-based configuration tool, Admin Console. Now you're ready to move on and take a deeper look at GlassFish and the way it is used. For further discussion, refer to Chapter 2.

Setting Up the NetBeans IDE

The NetBeans IDE is an open source integrated development environment that will be used throughout this book, making it easier for you to develop and deploy the samples discussed.

To learn more about the NetBeans IDE, you can visit its page at `http://www.netbeans.org/products/ide/`. Also, you might want to check out the NetBeans IDE 5.5.1 Installation Instructions page at `http://www.netbeans.org/community/releases/55/1/install.html`, which provides the NetBeans IDE 5.5.1 installation instructions for Windows, Solaris OS, Linux, and Macintosh OS X. Another interesting document to check out is the "NetBeans IDE 5.5 Quick Start Guide" that is available at `http://www.netbeans.org/kb/55/quickstart.html`.

Obtaining the NetBeans IDE

You can download the NetBeans IDE from the NetBeans downloads page at `http://www.netbeans.info/downloads/index.php`. As of this writing, the most recent stable release of NetBeans IDE is 5.5.1. It is interesting to note that the NetBeans IDE can be downloaded in different bundles. For example, you can download the package containing the NetBeans IDE alone or the NetBeans IDE with the Java EE application server bundle, which contains the NetBeans IDE and a Java EE application server in a single download. For the purpose of this book, though, you should download the package containing nothing but the NetBeans IDE.

■ **Note** When downloading NetBeans bundled with an application server, you in fact have several choices. For example, you can download the NetBeans IDE bundled with a Sun Java system application server or with a JBoss application server. In our situation here, you don't need to download the NetBeans IDE bundled with an application server, since you should have already installed GlassFish on your system.

Once you have obtained the installation package, you can proceed to the installation. Before you can do that, though, make sure you have the JDK installed on your system. To install NetBeans IDE 5.5.1, you must have JDK version 5.0 or later.

Installing the NetBeans IDE on Windows

To install NetBeans IDE 5.5.1 on Windows, follow these steps:

1. Execute the installer file to launch the installation process. As a result, you will see the first installer screen, which looks like Figure 1-5.

Figure 1-5. *The welcome screen of the NetBeans IDE 5.5.1 Installer*

2. On the welcome screen of the wizard shown in Figure 1-5, click Next.
3. On the License Agreement screen, read the agreement, choose I Accept the Terms in the License Agreement if you agree with it, and then click Next.
4. On the next screen, specify a new or empty directory in which you want to install the NetBeans IDE.

5. On the next screen, choose a JDK from the list of suitable JDKs found on your machine and then click Next.
6. On the next screen, confirm that the specified location is correct and that you have enough space for the installation and then click Next to start the installation.
7. On the last screen of the wizard informing you that the NetBeans IDE has been successfully installed on your computer, click Finish to exit the wizard.

After performing these steps, you should have the NetBeans IDE installed and ready for use.

Installing the NetBeans IDE on Linux

To install NetBeans IDE 5.5.1 on Linux, follow these steps:

1. In the command-line console, change the directory to the directory containing the installer:

```
# cd path_to_install_dir
```

2. Set the execute permission for the installer:

```
# chmod +x netbeans-5_5_1-linux.bin
```

3. Run the installer:

```
# ./netbeans-5_5_1-linux.bin
```

4. On the License Agreement screen, read the agreement, choose I Accept the Terms in the License Agreement if you agree with it, and then click Next.
5. On the next screen, specify a new or empty directory in which you want to install the NetBeans IDE.
6. On the next screen, choose a JDK from the list of suitable JDKs found on your machine and then click Next.
7. On the next screen, confirm that the specified location is correct and that you have enough space for the installation and then click Next to start the installation.
8. On the last screen of the wizard informing you that the NetBeans IDE has been successfully installed on your computer, click Finish to exit the wizard.

After performing the previous steps, you should have the NetBeans IDE installed and ready for use.

Connecting the NetBeans IDE to GlassFish

Now that you have installed the NetBeans IDE, you need to connect it to your GlassFish installation so that applications built with the IDE can be easily deployed to the application server. To do this, follow these steps:

1. Launch the NetBeans IDE from the Start menu of your operating system. When launched, the IDE looks like Figure 1-6.

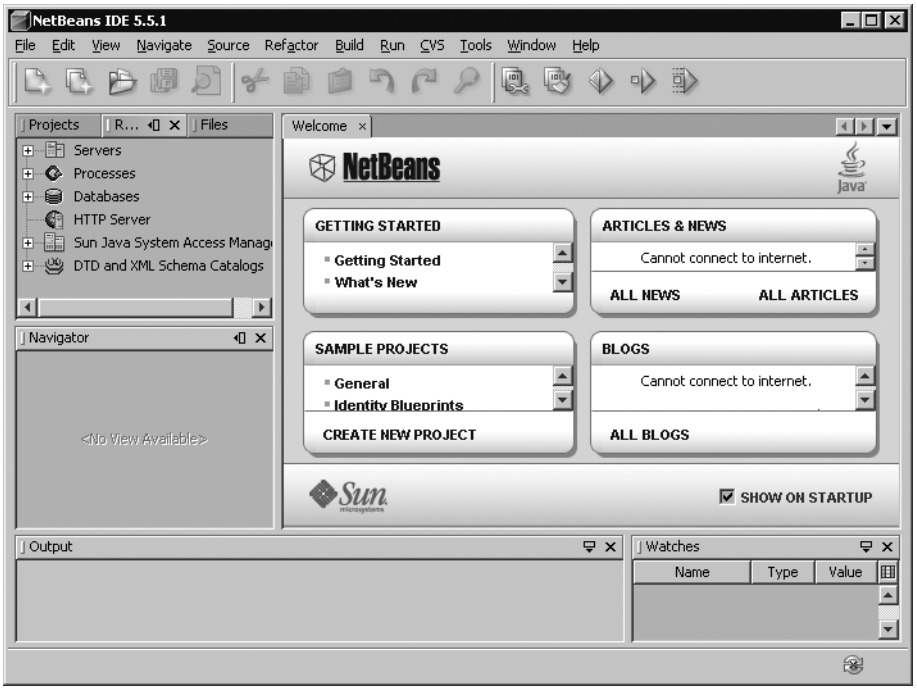

Figure 1-6. *The NetBeans IDE 5.5.1 when you launch it for the first time*

2. In the NetBeans IDE, select Tools ➤ Server Manager.

3. In the Server Manager dialog box, click the Add Server button. As a result, the Add Server Instance dialog box appears.

4. On the Choose Server screen of the Add Server Instance dialog box, choose Sun Java System Application Server in the Server combo box and then type **GlassFish** in the Name box. Then, click Next.

5. On the Platform Folder Location screen of the Add Server Instance dialog box, choose the directory of your GlassFish installation, and click Next.

6. On the Domain Admin Login Info screen of the Add Server Instance dialog box, specify the password for the `admin` user, and click Finish.

7. In the Server Manager dialog box, click Close.

After you've completed these steps, the NetBeans IDE will deploy your application to the GlassFish application server by default if you select the Deploy Project item from the pop-up menu that appears when right-clicking the application in the Project window. In the "Deploying Applications to the Server" section in Chapter 2, you will see a simple example of how to deploy an application to GlassFish from within the NetBeans IDE.

Setting Up Oracle Database XE

As mentioned earlier, the samples discussed in this book assume you install either an Oracle Database or MySQL on your computer. It is left up to you which one of the previous two to choose. However, there will be nothing wrong with choosing both, because they both can be installed on the same computer and can be used simultaneously.

This section explains how to set up Oracle Database XE on your computer. You can refer to the appendix if you want to learn some advantages of using this lightweight Oracle Database that is free to develop, deploy, and distribute.

At the time of this writing, Oracle Database XE is available only for Windows and Linux. So, the following sections describe the basic installation steps for these two operating systems. Once have completed these steps, you will have an Oracle Database XE server (including a database), Oracle Database XE client, and SQL*Plus installed on your computer.

Obtaining Oracle Database XE

All Oracle Database software is available for download from the Oracle Technology Network (OTN). To obtain Oracle Database XE, you can visit its page on OTN at `http://www.oracle.com/technology/software/products/database/xe/index.html` and then follow a link to the Download page.

On the Download page, obtain the Oracle Database XE installation executable appropriate for your platform.

■ **Note** To follow the Oracle-related examples throughout this book, you are not in fact limited to using Oracle Database XE—any edition of Oracle Database will do. Note, however, that whereas any edition of Oracle Database can be downloaded and then used for developing and prototyping for free, only Oracle Database XE can still be used for free in the production environment.

Installing Oracle Database XE on Windows

To install Oracle Database XE on Windows, follow these steps:

1. Log in to Windows as a user of the Administrators group.
2. Make sure to remove the `ORACLE_HOME` environment variable if it has been set on your system. You can do this in the System Properties dialog box, which can be invoked from the System Control Panel.
3. Launch the Oracle Database XE installation executable downloaded from OTN to run the Oracle Database XE Server installer.

   Figure 1-7 shows what the Oracle Database XE Server installer window looks like after you just ran it.

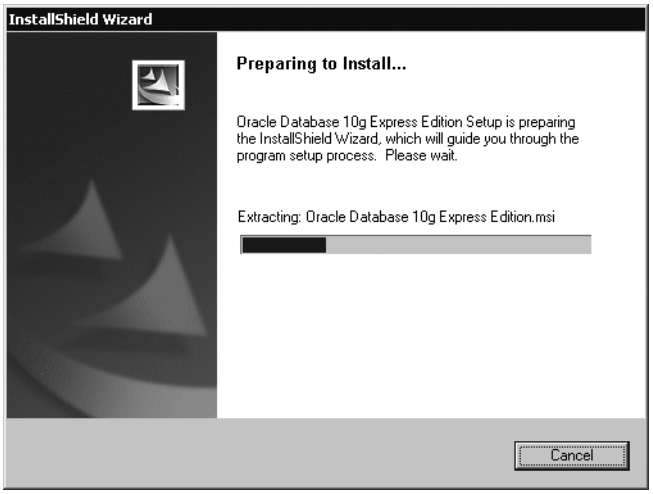

Figure 1-7. *The Preparing to Install screen of the Oracle Database XE Server installer on Windows*

4. On the welcome screen, click Next.
5. On the License Agreement screen, click I Accept and then click Next.
6. On the Choose Destination Location screen, choose the directory in which you want to install Oracle Database XE and then click Next.
7. You will be prompted to enter an available port number or numbers if at least one of the following port numbers is already in use on your system: 1521, 2030, or 8080. Otherwise, these numbers will be used automatically.
8. On the Specify Database Passwords screen, specify the passwords for the `SYS` and `SYSTEM` database accounts and click Next.
9. On the Summary screen, click Install to continue with the installation, or click Back to turn back and modify the settings.
10. On the last screen of the wizard that appears after the installation is complete, click Finish.

After you've completed these steps, your database server should be ready for use.

Installing Oracle Database XE on Linux

To install Oracle Database Express Edition on Linux, follow these steps:

1. Log in to your computer as `root`.
2. Change the directory to the one in which you downloaded the Oracle Database XE `oracle-xe-10.2.0.1-1.0.i386.rpm` installation executable, and install the RPM:

```
# rpm -ivh oracle-xe-10.2.0.1-1.0.i386.rpm
```

3. When prompted, run the following command to configure the database:

```
# /etc/init.d/oracle-xe configure
```

4. When prompted to enter the configuration information, accept the default port numbers for the Oracle Database XE graphical user interface and Oracle Database listener: 8080 and 1521, respectively. Then, specify the passwords for the SYS and SYSTEM default user accounts.

Assuming that during the installation you answered Yes to the question of whether you want the database to automatically start along with the computer, you should have the database server up and ready for use now. Otherwise, you have to start it manually as follows:

```
# /etc/init.d/oracle-xe start
```

Testing the Database Server with Oracle SQL*Plus

The simplest way to make sure your Oracle Database has been installed successfully and the database server is working properly is to issue a SQL statement against the database.

■ **Note** Structured Query Language (SQL) provides a universal way to interact with relational databases. Each database, though, has its own SQL dialect, providing an additional set of commands and functions specific to that particular database. For example, to interact with Oracle Database, you use Oracle SQL.

To issue a SQL statement against an Oracle Database, you can use Oracle SQL*Plus, an interactive and batch query command-line tool that is installed by default with every Oracle Database installation. Assuming you have an Oracle Database server installed and running on your system, you can launch Oracle SQL*Plus from a terminal window by entering `sqlplus`. Then, you will be prompted to enter a username to connect to the database. You can connect as SYSDBA by entering `/as sysdba`.

Once you are connected, you should see the `SQL>` prompt where you can enter a SQL statement to be issued against the database. For example, you might enter the following simple statement to make sure the database server is reachable:

```
SELECT SYSDATE FROM DUAL;
```

The previous statement should produce the output representing the system date, and that might look like this:

```
SYSDATE
---------
07-NOV-07
```

As you no doubt have realized, the previous is a toy example. Here, the only information you receive from the database server is the system date. Practically, you will use SQL*Plus to

access database data, as well as perform database administration tasks and manipulate database objects.

Setting Up the hr/hr Demonstration Schema

All Oracle Databases usually come with one or two demonstration schemas installed by default during a typical installation and containing a few related tables populated with data. The most recent Oracle Database releases include the `hr/hr` demonstration schema, which will be used in some simple Oracle-related samples in this book. So, you first need to make sure this schema is present and unlocked in the database. To find out whether the `hr/hr` schema exists, you can try to connect to it from within SQL*Plus as follows:

```
CONN hr/hr
```

If the `hr/hr` account exists but is locked, you should receive the following error message:

```
ERROR:
ORA-28000: the account is locked

Warning: You are no longer connected to ORACLE.
```

In that case, you should reconnect as `SYSDBA` and then issue the `ALTER USER` statement to unlock the `hr/hr` account:

```
CONN /as sysdba
ALTER USER hr ACCOUNT UNLOCK;
```

Now you can connect as `hr/hr` and perform a query against one of the `hr` default tables:

```
CONN hr/hr
SELECT count(*) FROM employees;
```

The previous query should count the number of rows in the `hr.employees` table and produce the following output:

```
COUNT(*)
---------
107
```

Now that you have seen that everything works properly, you may want to quit the SQL*Plus session. To do this, simply enter the following:

```
quit
```

In Chapter 6, which covers how to implement the database tier of a Java EE application, there will be plenty of opportunities to get your hands dirty issuing SQL queries against an Oracle Database from SQL*Plus.

Testing the Database Home Page

Oracle Database XE comes with the Database home page, a browser-based user interface that makes administering the database much easier. You can use this interface as a GUI alternative to the SQL*Plus command-line tool discussed in the preceding section.

After you have installed Oracle Database XE, you can start the Database home page by following these steps:

1. You can launch the Database home page from the Start menu of your operating system—find the Oracle Database Express Edition menu group, and select Go to Database Home Page within it. This launches the Database home page within a browser.

2. On the Database Login page, enter a valid database username and password, and click Login. For example, to log in as an administrator, you can use the `SYSTEM` account, providing the password specified during the installation.

After performing these steps, you should see the Database home page, which looks similar to the one shown in Figure 1-8.

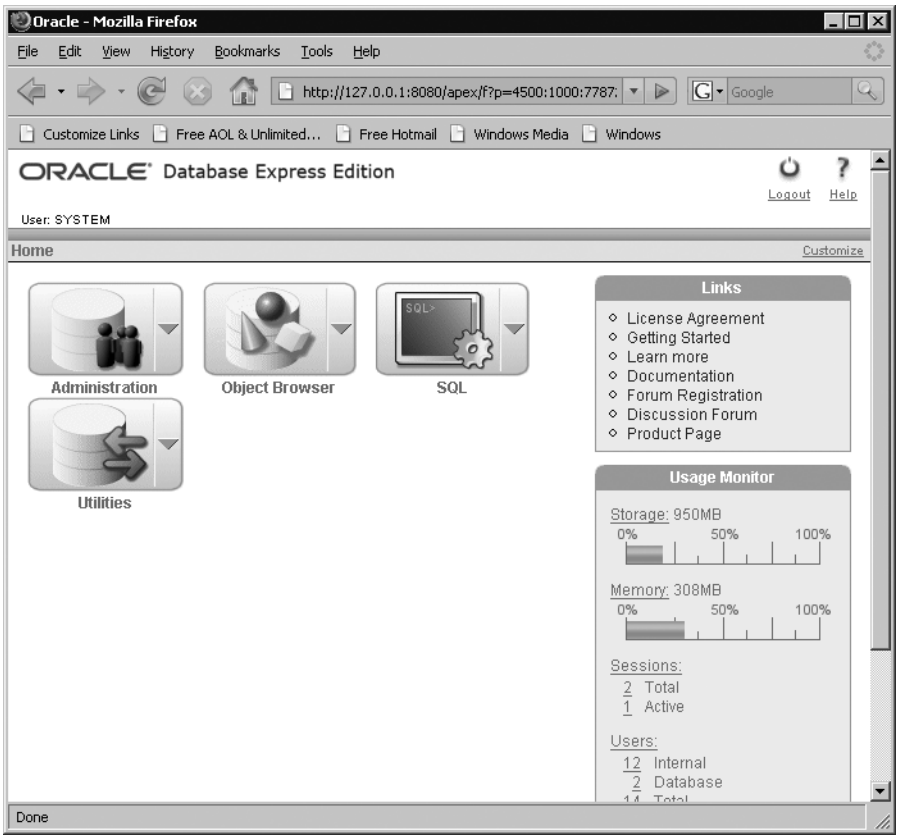

Figure 1-8. *The home page of the Oracle Database XE graphical user interface, a GUI tool installed by default during Oracle Database XE server installation*

Now that you're logged in to the database via the Database home page, you can perform administration tasks, access database data, and manipulate database objects—the same tasks you can do when connected via SQL*Plus discussed in the preceding section. For example, to alter the `hr/hr` demonstration schema through the Database home page, you can follow these steps:

1. On the Database home page, click the Administration icon.
2. On the Administration page, click the Database Users icon.
3. On the Manage Database Users page, click the HR icon to go to the `hr/hr` schema page.
4. On the `hr/hr` schema page, you can change the settings as required and click Alter User to apply the changes made. Otherwise, you can click Cancel.

It is important to note that the Database home page is a highly multifunctional tool. Besides offering an integrated visual environment for performing administration tasks and manipulating database objects and data, this graphical interface also provides integrated tools for monitoring important database parameters, such as current memory allocation and storage space usage. It also allows you to export and import data to and from external data sources, generate reports, and run SQL queries like you would with SQL*Plus.

Concluding this short guide on Oracle Database XE installation and initial testing, it should be noted that if you have managed to execute all the tasks discussed here, this means your Oracle Database installation has been successful and the database server is working properly.

Setting Up MySQL

Although MySQL can be set up on many operating systems, this section provides the installation steps only for Windows and Linux, two most popular platforms nowadays. Then, I'll provide concise instructions for testing your MySQL installation. Also, you might want to check out the MySQL Documentation page at `http://dev.mysql.com/doc/`. On this page you can find a set of MySQL reference manuals available in a variety of languages and for different MySQL releases.

Obtaining MySQL

When choosing MySQL, you in fact have more than one choice. Generally speaking, you can choose between MySQL Community Server and MySQL Enterprise. The former is a freely downloadable version of MySQL and can be used under the open source GPL license. The latter is used on a commercial basis only. In more detail, the difference between these two editions is discussed in the "Which Should I Use: MySQL Enterprise or MySQL Community Server" document available at `http://www.mysql.com/products/which-edition.html`.

■ **Note** In fact, MySQL Enterprise is available in four levels—Basic, Silver, Gold, and Platinum—thus allowing you to choose the service level most suitable for you. For further information, you can refer to the MySQL Enterprise Features page at `http://www.mysql.com/products/enterprise/features.html`.

The MySQL Downloads page available at `http://dev.mysql.com/downloads/` contains a questionnaire designed to help you choose between MySQL Community Server and MySQL Enterprise. Once you have made your decision, you can move on and start downloading the MySQL distribution. To follow the MySQL-related samples provided in this book, you don't have to purchase MySQL Enterprise—having MySQL Community Server installed will be enough.

You can download the MySQL distribution from the MySQL Downloads page at `http://dev.mysql.com/downloads/mysql`. The MySQL-related book samples assume you will use MySQL Server 5.1 or newer.

If you are a Windows user, pick up the `Windows Essentials` file from the Windows downloads section on the page. This file contains the minimum set of files needed to install MySQL, including the Configuration Wizard. If you want to download the package containing all the MySQL components, consider the Complete Package available on the same page and packed within a zip archive, `mysql-5.1.xx-beta-win32.zip`, assuming that you choose MySQL 5.1. At the time of this writing, though, MySQL 6.0 is available. You can download MySQL 6.0 from `http://dev.mysql.com/downloads/mysql/6.0.html`.

If you're using Linux, then pick up the RPMs for Server and Client from the appropriate section of the MySQL Downloads page. These packages are required for a standard minimal installation.

Installing MySQL on Windows

Installing MySQL on your computer is as easy as choosing the appropriate options and clicking Next buttons in the wizard. To install MySQL on Windows, follow these steps:

1. Execute the downloaded `mysql-essential-5.1.xx-beta-win32.msi` or `Setup.exe` extracted from `mysql-5.1.xx-beta-win32.zip` to start installing MySQL.
2. Click Next on the first screen of MySQL Server's Setup Wizard, which should look like Figure 1-9.
3. On the Setup Type page of the MySQL Setup Wizard, you have to choose Typical, Complete, or Custom. It is OK if you choose the Typical installation type.
4. In the Confirmation screen, click the Install button to begin the installation.
5. On the final screen of the installer, make sure the Configure the MySQL Server Now check box is checked, and click Finish. As a result, the MySQL Configuration Wizard launches.
6. On the Configuration Type screen of the Configuration Wizard, choose the Standard Configuration option to get started with MySQL quickly. The following steps assume that you chose the Standard Configuration option in this step.

Figure 1-9. *The welcome screen of the Setup Wizard for MySQL Server 5.1*

7. On the next screen, make sure that the Install As Windows Service option is selected, and click Next.
8. On the next screen, set the password for the `root` user.
9. On the final screen of the MySQL Configuration Wizard, click the Execute button to complete the configuration process.

After you have completed these steps, the MySQL server should be up and running on your Windows machine.

Installing MySQL on Linux

Using the RPM packages is the recommended way to install MySQL on Linux. The following steps assume your Linux supports RPMs:

1. Perform the following commands to install the server and client RPMs picked up from the MySQL Downloads page:
   - `# rpm -i MySQL-server-VERSION.i386.rpm`
   - `# rpm -i MySQL-client-VERSION.i386.rpm`

   By default, the server RPM adds the entries to `/etc/init.d/`, which are required to start the `mysqld` server automatically at boot time.
2. After the installation, it is highly recommended you assign the password to the anonymous accounts:
   - `# mysql -u root`
   - `mysql> SET PASSWORD FOR ''@'localhost' = PASSWORD('new_pswd');`
   - `mysql> SET PASSWORD FOR ''@'your_hostname' = PASSWORD('new_pswd');`

After you have completed these steps, the MySQL server should be up and running on your machine.

Setting Up a New User Account with the MySQL Command-Line Client

Now that you have the MySQL database server installed on your computer, it is time to verify that it is up and ready for use. To start with, you might want to set up a new user account on your MySQL database server. This section explains how to do this with the help of the MySQL command-line client, a command prompt tool bundled with the MySQL installation. The user account set up here will be used in the MySQL-related examples throughout the book.

To start a MySQL command-line session from a terminal, you use the `mysql` command. For example, to connect to the database server as the `root` user from the localhost, you might enter the following command:

```
mysql -h localhost -u root -p
```

In response, you will be prompted to enter the `root` password. You should enter the `root` password specified during installation. If everything is OK, you should see the `mysql>` prompt through which you can interact with the server.

Now, let's create a new database on the server. To do this, you might enter the following command:

```
CREATE DATABASE mydb;
```

■ **Note** It is interesting to note that a MySQL database is implemented as a directory, and the tables belonging to this database are implemented as files within that directory.

The next step is to create a new user account and grant to it the privileges required to operate with the newly created database. You can do this with the following command:

```
GRANT CREATE, DROP, SELECT, INSERT, UPDATE, DELETE
ON mydb.*
TO 'usr'
IDENTIFIED BY 'pswd';
```

The previous command creates the `usr` user account and grants the privileges to it, which are required to perform a common set of operations on the `mydb` database. Now you can connect as the `usr/pswd` user to the server. To do this, you first need to disconnect from the server:

```
EXIT
```

This will take you back to the operating system prompt. Then, you should enter the following command:

```
mysql -h localhost -u usr -p
```

When asked, enter `pswd` as the password. As a result, you will be connected as the `usr` user to the database server. Now you can instruct MySQL to use the `mydb` database by default. To do this, you should issue the following command:

```
USE mydb
```

At the moment, the `mydb` database is empty. You will create tables in it when it comes to performing the first MySQL-related sample in Chapter 4. Also, you can explore examples in the appendix.

Now you might want to quit the MySQL command-line client. To do this, you can issue the following command:

```
QUIT
```

The MySQL command-line client tool will be used throughout this book when it comes to creating and manipulating MySQL database objects utilized within the samples discussed.

Managing the Database Server with MySQL GUI Tools

As an alternative to the MySQL command-line client tool, you might want to use a GUI tool or tools, which allow you to visually perform all the operations you may need to perform on your MySQL database and the data stored in it. To fulfill these needs, MySQL AB has developed the MySQL GUI Tools bundle containing the following tools:

- MySQL Administrator (`http://www.mysql.com/products/tools/administrator/`)
- MySQL Query Browser (`http://www.mysql.com/products/tools/query-browser/`)
- MySQL Migration Toolkit (`http://www.mysql.com/products/tools/migration-toolkit/`)

You can pick up this bundle from the MySQL GUI Tools Downloads page at `http://dev.mysql.com/downloads/gui-tools/`. At the time of this writing, MySQL GUI Tools was available for the MySQL 5.0 release.

The MySQL Administrator tool included in the MySQL GUI Tools bundle allows you to visually perform administrative tasks on your MySQL server. Say, for example, you want to add the `INDEX` privilege to the `usr` user account created in the preceding section so that this account can use the `CREATE INDEX` and `DROP INDEX` statements. To do this using MySQL Administrator, you can follow these steps:

1. Launch MySQL Administrator, and connect as the `root` user.
2. In the left column of MySQL Administrator, click the User Administration node.
3. In the bottom-left corner of the MySQL Administrator window, click usr.
4. In the right frame of the MySQL Administrator window, click the Schema Privileges tab.
5. On the Schema Privileges tab, select the mydb item in the box located on the left side of the tab. As a result, you should see the screen shown in Figure 1-10.

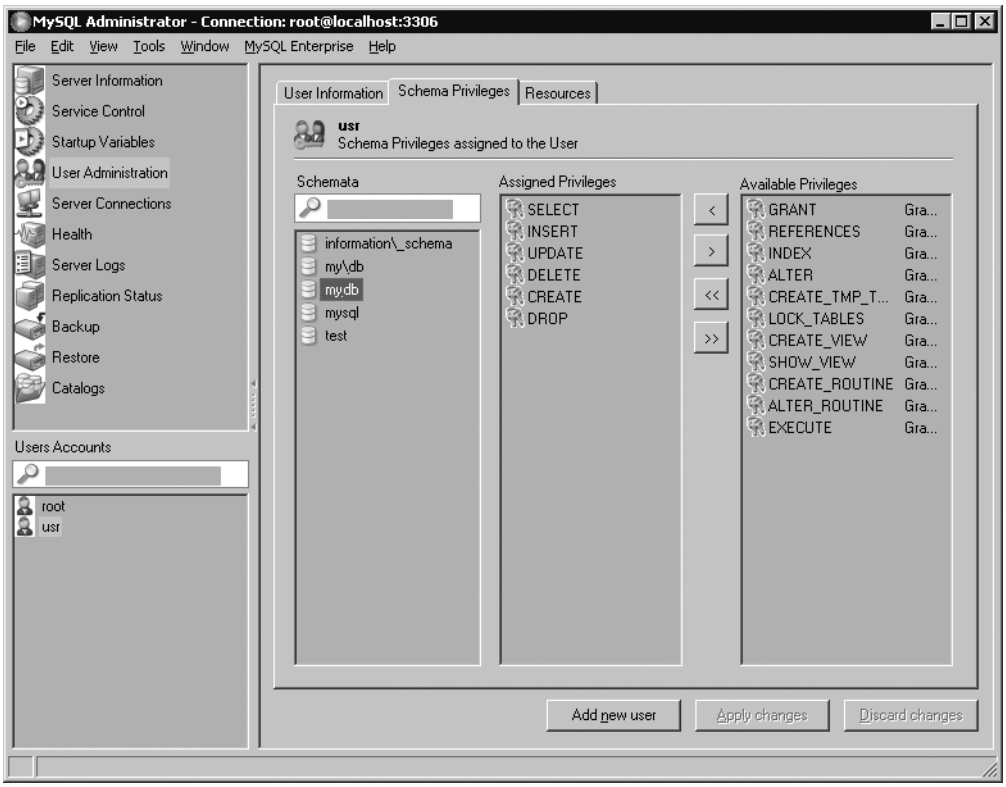

Figure 1-10. *The Schema Privileges tab of the User Administration screen in MySQL Administrator*

6. In the Available Privileges box, select the INDEX item, and click the < button to move the selected item to the Assigned Privileges box.

7. Click the Apply Changes button to apply the changes made.

8. Quit MySQL Administrator by choosing File ➤ Close.

Of course, you could still use the MySQL command-line client tool to accomplish the same goal: granting another privilege to a user account. To achieve that, being connected as `root`, you might issue the following statement:

```
GRANT INDEX
ON mydb.*
TO 'usr'
```

However, some developers prefer a GUI alternative, since a GUI tool gives a visual representation of the task being performed.

Summary

At this point, you should have set up all the software components required to follow the samples discussed in this book. Moreover, you should have a cursory knowledge of how this software works and how to handle it.