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## **Appendix A**

# **Practices and Solutions**

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## **Practices for Lesson 1**

**Background:** In this practice, you review concepts about Oracle architecture components and answer questions to test your knowledge of the concepts learned in the lesson.

## **Practice 1-1: Exploring the Oracle Database Architecture**

Fill in the blanks with the correct answers.

- 1) The two main components of a basic Oracle Database system:

\_\_\_\_\_ and \_\_\_\_\_

***Hint: see page 1-6***

- 2) The Instance consists of \_\_\_\_\_ and  
\_\_\_\_\_ processes.

***Hint: see page 1-6***

- 3) A session is a connection between the \_\_\_\_\_ process and the  
\_\_\_\_\_ process.

***Hint: see page 1-8***

- 4) Name the main components of the SGA:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

***Hint: see page 1-9***

## **Practice 1-1: Exploring the Oracle Database Architecture (continued)**

- 5) List six of the many background processes an Oracle Database instance might have:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

***Hint: see page 1-21***

- 6) The \_\_\_\_\_ process writes the dirty buffers to the data files.

***Hint: see page 1-23***

- 7) The \_\_\_\_\_ process writes the redo entries to the online redo log files.

***Hint: see page 1-25***

- 8) The primary files associated with an Oracle database are:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Additional important files are:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

***Hint: see page 1-33***

## **Practice 1-1: Exploring the Oracle Database Architecture (continued)**

9) The logical storage structures of an Oracle database are:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Hint:** see page 1-35

10) The \_\_\_\_\_ process copies the redo log files to an archive destination.

**Hint:** see page 1-31

11) The \_\_\_\_\_ contains data and control information for a server or background process.

**Hint:** see page 1-17

12) The logical tablespace structure is associated with the physical \_\_\_\_\_ files on disk.

**Hint:** see page 1-35

13) LGWR writes when:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Hint:** see page 1-25

## ***Practice 1-1: Exploring the Oracle Database Architecture (continued)***

- 14) State whether the following statements are true or false.
- a) The SGA includes the Database buffer cache and Redo log buffer. \_\_\_\_\_
  - b) Each server process has its own PGA. \_\_\_\_\_
  - c) The buffers in the database buffer cache are organized in two lists: the most recently used list and the least recently used (LRU) list. \_\_\_\_\_
  - d) User processes run the application or tool that connects to an Oracle Instance.  
\_\_\_\_\_
  - e) Oracle Database processes include server processes and background processes.  
\_\_\_\_\_
  - f) Checkpoints are recorded in log file headers. \_\_\_\_\_

***Hint:*** see pages 1-9, 1-10, 1-13, 1-20, 1-21, 1-27

## Practices for Lesson 2

**Background:** In the practices of this course, you assume the role of a database administrator (DBA). The operating system (OS) accounts on your computer are:

- The `oracle` user with a password of `oracle`
- The `root` user with a password of `oracle`

The system administrator has set up the OS so that it is ready for your Oracle software installation. You are performing two installations. The first installation is the Oracle Grid Infrastructure for a standalone server. The second installation is the Oracle Database 11g software.

The installation media is staged at:

- `/stage/11.2.0/clusterware/Disk1`. for Oracle Grid Infrastructure
- `/stage/11.2.0/database/Disk1`. for Oracle Database 11g

Perform the following tasks as the default `oracle` OS user, unless otherwise indicated.

**Note:** Completing this practice is critical for all following practice sessions.

## ***Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure***

In this practice you install the Oracle Grid Infrastructure for a standalone sever. During the installation, you configure the +DATA ASM disk group that will be used for storing database files for your database. After the installation is complete, you configure the +FRA ASM disk group that will be used for database backups and other database files for your database.

- 1) Start the Oracle Universal Installer (OUI) for the Oracle Grid Infrastructure. As the oracle user, navigate to the /stage/11.2.0/clusterware/Disk1 directory and enter ./runInstaller.

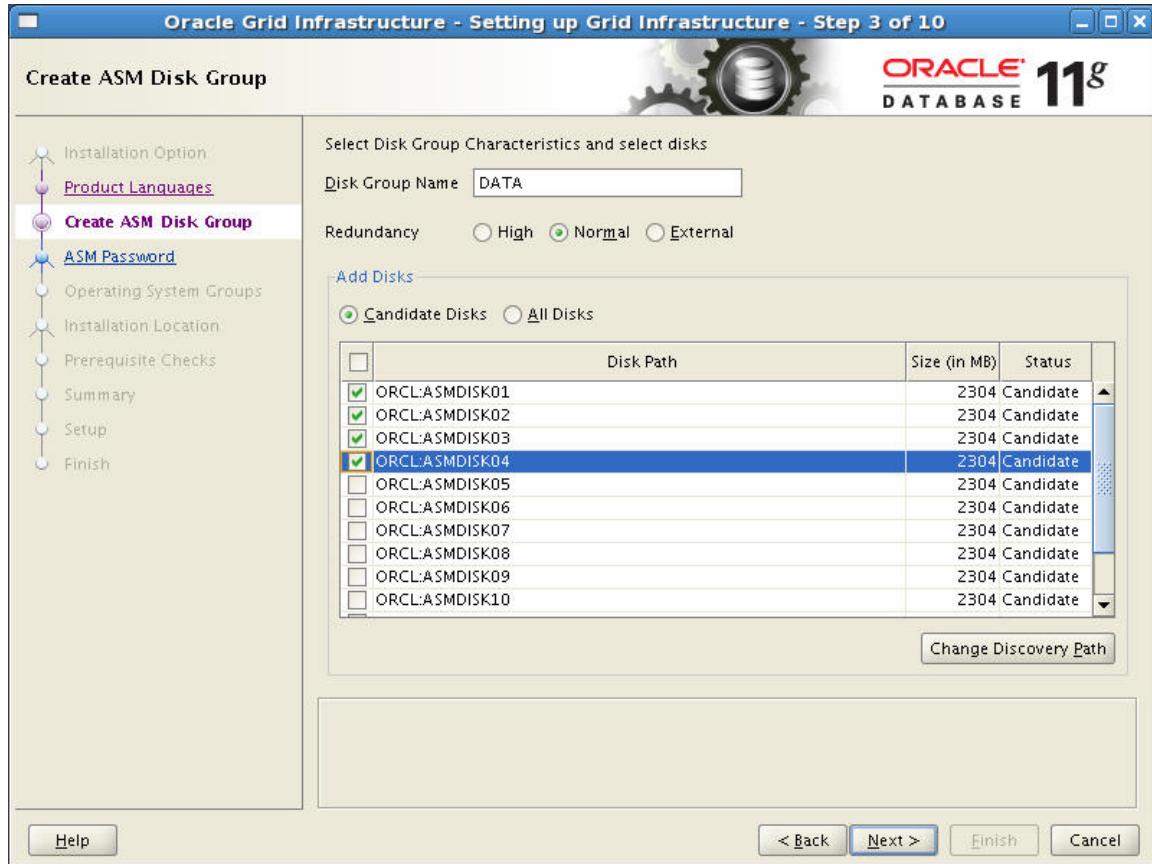
- a) Right-click the desktop and click Open Terminal to open a terminal window. Then enter the following:

```
$ cd /stage/11.2.0/clusterware/Disk1  
$ ./runInstaller
```

- 2) On the Select Installation Option page, select the Install and Configure Grid Infrastructure for a standalone server option and click Next.
  - 3) On the Product Languages page, select all the available languages and click Next.

## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- 4) On the Create ASM Disk Group page, ensure the Disk Group Name is DATA and Redundancy is Normal. Select the first four disk groups (**ORCL:ASMDISK01**, **ORCL:ASMDISK02**, **ORCL:ASMDISK03**, and **ORCL:ASMDISK04**) and then click Next.



- 5) On the Specify ASM Password page, select the option to use the same passwords for both **SYS** and **SYSTEM** accounts. Enter **oracle\_4U** as the password and click Next.
- 6) The Privileged Operating System Groups page is next. Because your installation is for a standalone server, the same operating system group (dba) can be used for all of the administration groups shown.

## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- a) Select **dba** for all three options and click **Next** to continue.



- b) A warning appears because we have specified the same operating group for all administrator groups. This is expected, so click **Yes** to continue.

## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- 7) On the Installation Location page, ensure that the value for Oracle Base is **/u01/app/oracle**. For Software Location, enter **/u01/app/oracle/product/11.2.0/grid**. Click **Next**.



- 8) On the Create Inventory page, accept all the defaults and click **Next** to continue.
- 9) The Perform Prerequisite Checks page is next. The OUI checks to make sure that your environment meets the minimum requirements for this installation. In many cases if a prerequisite check fails, the OUI can generate a fixup script to fix the problem. In our classroom, all prerequisites have been met so no issues are found and the OUI automatically advances to the next page.
- 10) On the Summary page, review the settings and information, and then click **Finish**.
- 11) The Setup page appears showing the progress of the installation and the status of the individual tasks being performed. When the Execute Configuration scripts window appears, follow the steps listed in the window.
- a) Open a terminal window and log in as **root**.
- ```
$ su -
Password:
#
```
- b) Run the scripts shown in the Execute Configuration scripts window.

## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- i) The first script is `/u01/app/oraInventory/orainstRoot.sh`.

```
# /u01/app/oraInventory/orainstRoot.sh
Changing permissions of /u01/app/oraInventory.
Adding read,write permissions for group.
Removing read,write,execute permissions for world.

Changing groupname of /u01/app/oraInventory to oinstall.
The execution of the script is complete.
#
```

- ii) The second script is

`/u01/app/oracle/product/11.2.0/grid/root.sh`. Accept the default of `/usr/local/bin` for the local bin directory by pressing Enter when prompted.

```
# /u01/app/oracle/product/11.2.0/grid/root.sh
Running Oracle 11g root.sh script...

The following environment variables are set as:
ORACLE_OWNER= oracle
ORACLE_HOME= /u01/app/oracle/product/11.2.0/grid

Enter the full pathname of the local bin directory:
[/usr/local/bin]:
Copying dbhome to /usr/local/bin ...
Copying oraenv to /usr/local/bin ...
Copying coraenv to /usr/local/bin ...

Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root.sh script.
Now product-specific root actions will be performed.
2009-07-08 09:35:07: Checking for super user privileges
2009-07-08 09:35:07: User has super user privileges
2009-07-08 09:35:07: Parsing the host name
Using configuration parameter file:
/u01/app/oracle/product/11.2.0/grid/crs/install/crsconfig_params
Creating trace directory
LOCAL ADD MODE
Creating OCR keys for user 'oracle', privgrp 'oinstall'..
Operation successful.
CRS-4664: Node edrsr12p1 successfully pinned.
Adding daemon to inittab
CRS-4123: Oracle High Availability Services has been started.
ohasd is starting
```

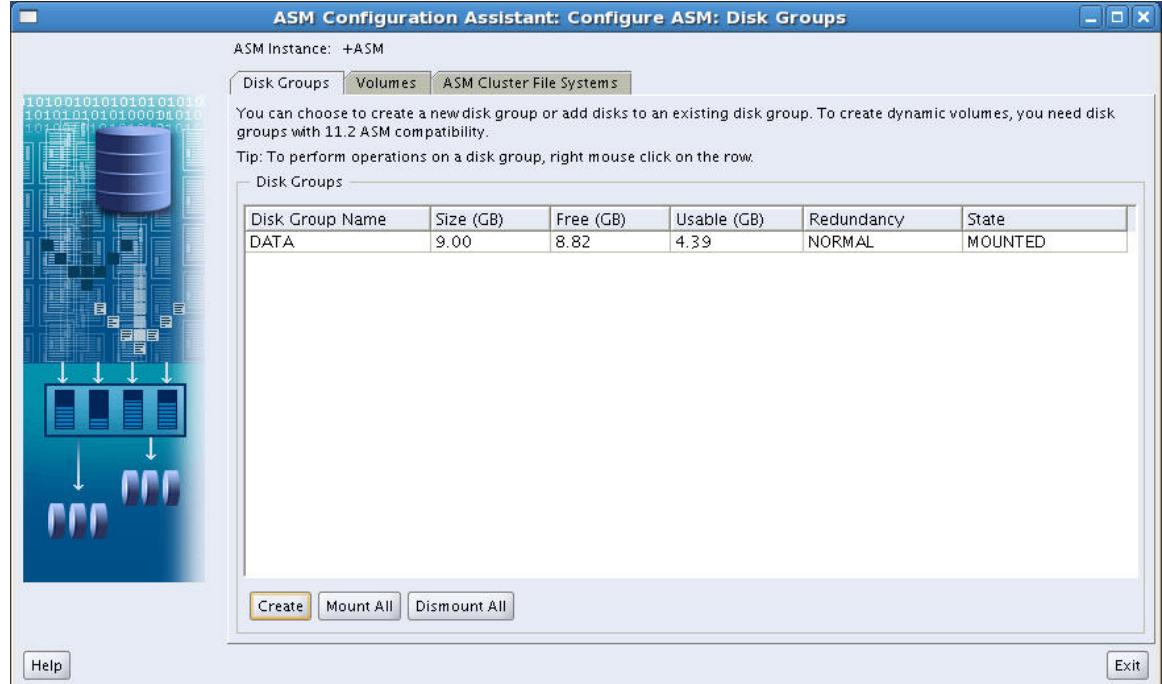
## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

```
edrsr12p1      2009/07/08 09:35:39
/u01/app/oracle/product/11.2.0/grid/cdata/edrsr12p1/backup_200
90708_093539.olr
Successfully configured Oracle Grid Infrastructure for a
Standalone Server
#
```

- c) Click **OK** in the Execute Configuration scripts window. The OUI continues with the remaining installation tasks.
- 12) Click **Close** on the Finish page to complete the installation of the Oracle Grid Infrastructure for a standalone server.
- 13) The next step is to configure the +FRA disk group. In a terminal window, logged in as **oracle**, perform the following steps:
  - a) Use the **oraenv** utility to set the environment for the terminal session. Enter **+ASM** when prompted for the **ORACLE\_SID**:

```
$ . oraenv
ORACLE_SID = [orcl] ? +ASM
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is
/u01/app/oracle
```

- b) Start the ASM Configuration Assistant by entering **asmca** at the command line.
- \$ **asmca**
- c) The ASM Configuration Assistant opens displaying the current disk groups for the +ASM instance. Click **Create**.

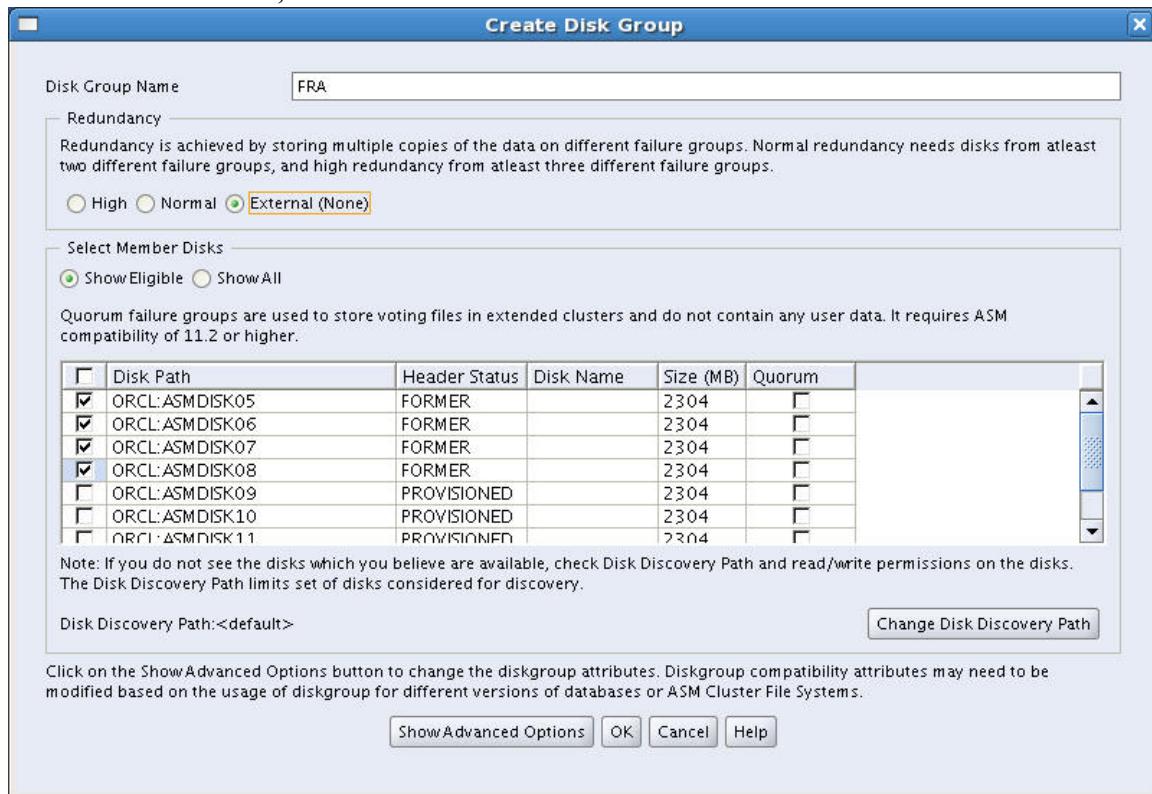


## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- d) Enter **FRA** for the Disk Group Name. Select External (None) for redundancy.

Select disk groups **ORCL:ASMDISK05**, **ORCL:ASMDISK06**,

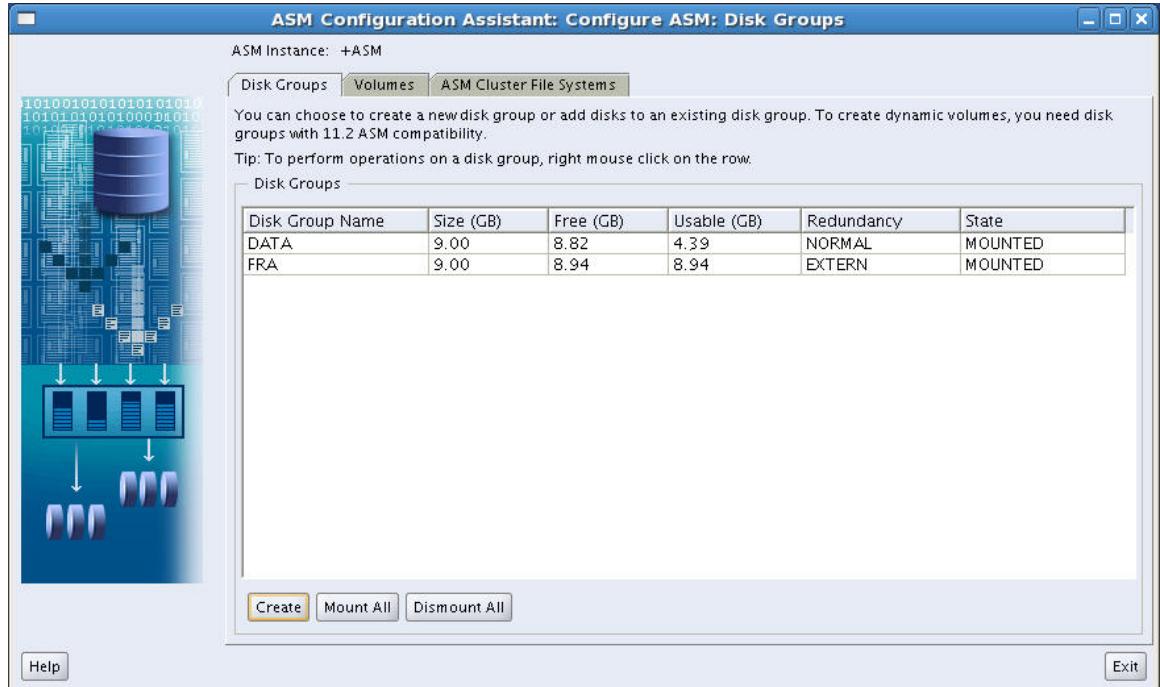
**ORCL:ASMDISK07**, and **ORCL:ASMDISK08** and click **OK**.



- e) Click **OK** in the DiskGroup: Creation window when it appears.

## **Practice 2-1: Installing and Configuring the Oracle Grid Infrastructure (continued)**

- f) Notice that now there are two disk groups (DATA and FRA) listed for the +ASM instance. Click **Exit**.



- g) Click **Yes** when asked if you really want to quit this application.  
14) Close any open terminal windows.

## **Practice 2-2: Installing the Oracle Database 11g Software**

The next step is to install the Oracle Database 11g software.

- 1) Open a new terminal window and install the Oracle database software as the `oracle` user. Navigate to the `/stage/11.2.0/database/Disk1` directory, and start the Oracle Universal Installer (OUI) by entering `./runInstaller`.
  - a) Right-click the desktop and click Open Terminal to open a terminal window. Then enter the following:

```
$ cd /stage/11.2.0/database/Disk1  
$ ./runInstaller
```

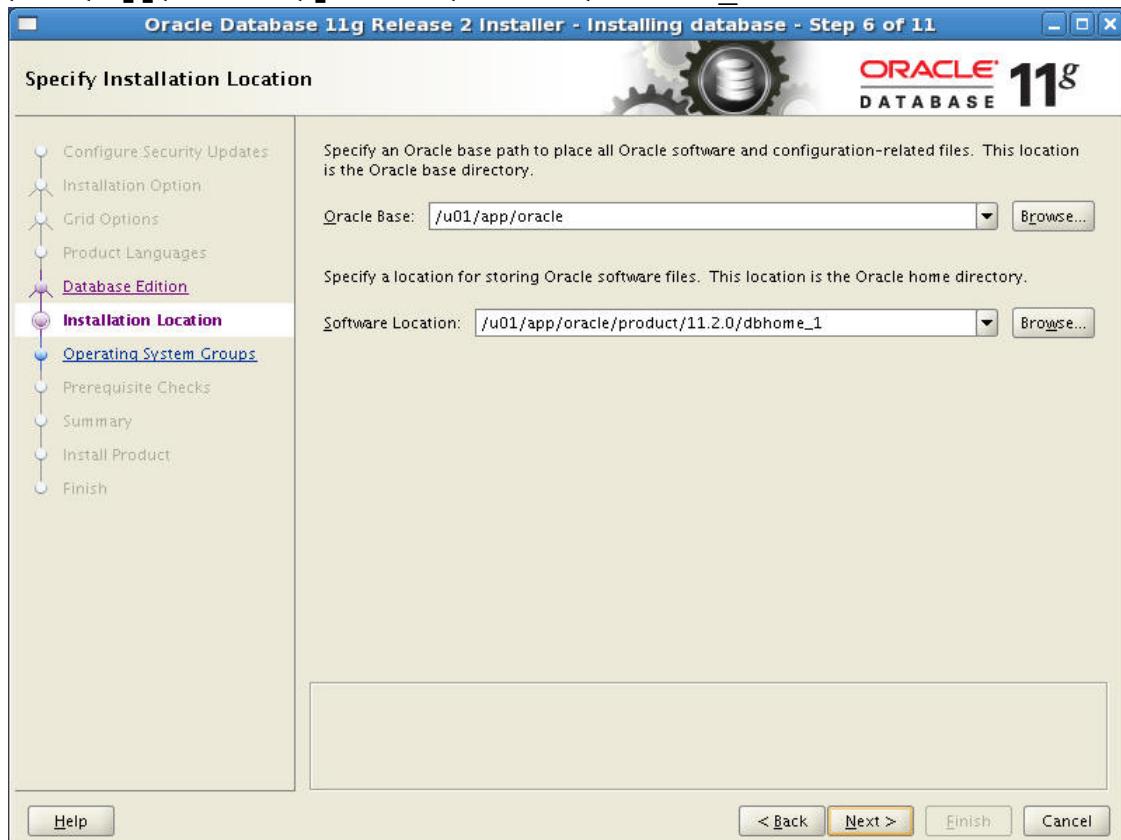
- 2) The Configure Security Updates page is the first to appear. In your real-world environment, you would enter your email address and My Oracle Support password; however, because the classroom is an isolated environment, please leave the email and password fields blank. Deselect the option to receive security updates from My Oracle Support and click **Next**.
- 3) Click **Yes** in the Email Address Not Specified warning message that appears.
- 4) On the Installation Option page, select the **Install database software only** option and click **Next**.



- 5) Ensure that **Single instance database installation** is selected on the Install Type page and click **Next**.
- 6) On the Product Languages page, select all the available languages and click **Next**.

## **Practice 2-2: Installing the Oracle Database 11g Software (continued)**

- 7) On the Select Database Edition page, ensure **Enterprise Edition (3.95GB)** is selected and click **Next**.
- 8) On the Installation Location page, ensure that the value for Oracle Base is `/u01/app/oracle`. For Software Location, enter `/u01/app/oracle/product/11.2.0/dbhome_1`. Click **Next**.



- 9) Select **dba** for both the OSDBA and OSOPER groups on the Privileged Operating System Groups page and click **Next**.
- 10) The OUI then performs prerequisite checks. No problems should be found and the Summary page should appear next. Click **Finish**.
- 11) The Install Product page appears, showing you the progress of the installation and the status for each individual task being performed. When the Execute Configuration scripts window appears, follow the steps listed in the window.
  - a) Open a terminal window and log in as `root`.

```
$ su -
Password:
#
```

- b) Run the script shown in the Execute Configuration scripts window. Accept the default for the local `bin` directory and do not overwrite any files (you can just press [Enter] because the default option is to not overwrite).

## **Practice 2-2: Installing the Oracle Database 11g Software (continued)**

```
# /u01/app/oracle/product/11.2.0/dbhome_1/root.sh
Running Oracle 11g root.sh script...

The following environment variables are set as:
ORACLE_OWNER= oracle
ORACLE_HOME=  /u01/app/oracle/product/11.2.0/dbhome_1

Enter the full pathname of the local bin directory:
[/usr/local/bin]:
The file "dbhome" already exists in /usr/local/bin. Overwrite
it? (y/n)
[n]:
The file "oraenv" already exists in /usr/local/bin. Overwrite
it? (y/n)
[n]:
The file "coraenv" already exists in /usr/local/bin.
Overwrite it? (y/n)
[n]:

Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root.sh script.
Now product-specific root actions will be performed.
Finished product-specific root actions.
#
```

- c) Click **OK** on the Execute Configuration scripts window.
- 12) Click **Close** on the Finish page to complete the installation of the Oracle Database 11g software.

## **Practices for Lesson 3**

**Background:** You are about to begin creating your first Oracle database. You anticipate that several similar databases will be needed in the near future. Therefore, you decide to create your `orcl` database, as well as a database template and the database creation scripts. Locate the scripts in the `/home/oracle/labs` directory (which is the directory that you use most often throughout this course).

## **Practice 3-1: Creating an Oracle Database**

In this practice, you create the `orcl` database. You use the Database Configuration Assistant (DBCA) to create the database.

- 1) Start the Database Configuration Assistant (DBCA).
  - a) Open a terminal window as the `oracle` user by right-clicking your desktop and selecting **Open Terminal**.
  - b) Set your `ORACLE_HOME` environment variable by using `oraenv`. Enter `orcl` for the SID and then enter  
`/u01/app/oracle/product/11.2.0/dbhome_1` for `ORACLE_HOME`.  
**Note:** You enter the full `ORACLE_HOME` path at this time because the `orcl` database does not yet exist. After the database is created, you will only have to enter `orcl` as the SID and it will determine the correct `ORACLE_HOME`.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
ORACLE_HOME = [/home/oracle] ?
/u01/app/oracle/product/11.2.0/dbhome_1
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
```

- c) To start the DBCA, enter:

```
$ dbca
```

- 2) Click **Next** on the Welcome page to begin the `orcl` database creation.
- 3) On the Operations page, select **Create a Database**, and then click **Next**.
- 4) On the Database Templates page, select the **General Purpose or Transaction Processing** template.
  - a) Click **Show Details** and answer the following questions:
    - i) **Question 1:** How many control files are created?

**Answer:** Two

**Note:** The location will change later in this practice when we choose to use ASM as our storage technique.

- ii) **Question 2:** How many redo log groups are created?

**Answer:** Three

**Note:** The location will change later in this practice when we choose to use ASM as our storage technique.

- iii) **Question 3:** What is the database block size (`db_block_size`)?

**Answer:** 8 KB

## **Practice 3-1: Creating an Oracle Database (continued)**

- iv) **Question 4:** What is the value of Sample Schemas?

**Answer:** Sample Schemas is set to False.

**Note:** You will change this setting later in this practice so that the HR sample schema is included in your database.

- v) **Question 5:** What is the template default for the Database Character Set?

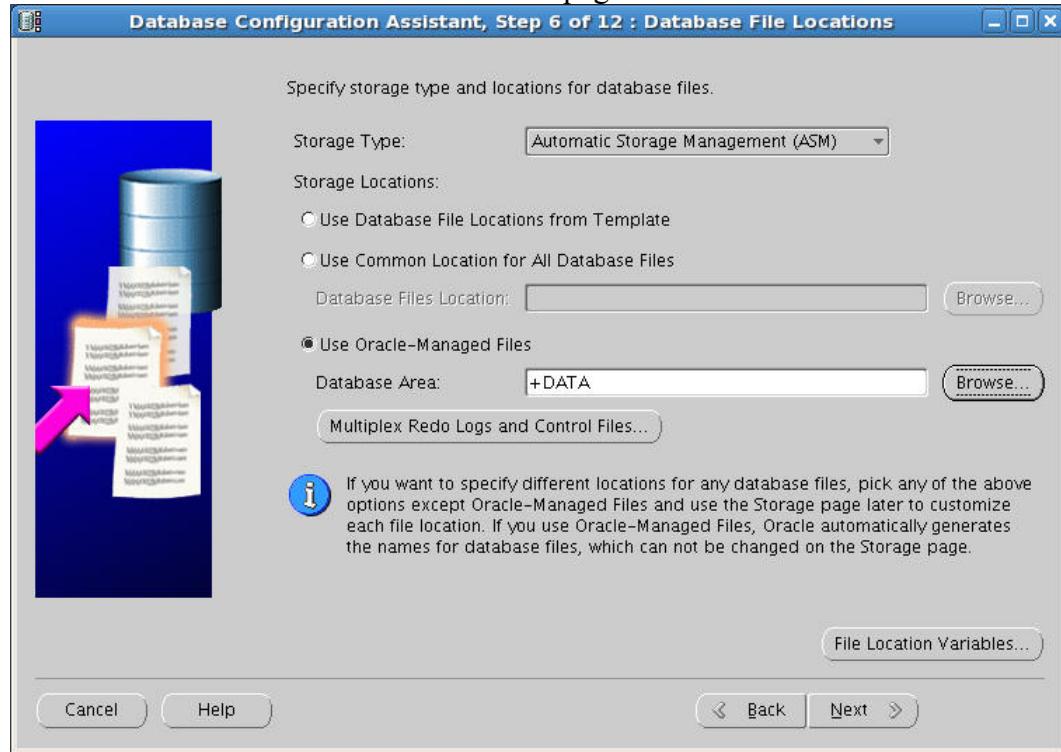
**Answer:** WE8MSWIN1252

**Note:** You will change this setting later in this practice to use a Unicode database character set.

- b) Click **Close** to close the Template Details window.
- c) Click **Next** on the Database Templates page to continue the database creation process.
- 5) On the Database Identification page, enter **orcl.example.com** as Global Database Name. The SID defaults to the database name **orcl**. Click **Next**.
- 6) On the Management Options page, ensure that the following items are selected:
  - a) On the Enterprise Manager tab, ensure that both **Configure Enterprise Manager** and **Configure Database Control for local Management** are selected.
  - b) On the Automatic Maintenance Tasks tab, ensure that **Enable automatic maintenance tasks** is selected.
  - c) Click **Next** to continue.
- 7) On the Database Credentials page, select **Use the Same Password for All Accounts** and enter **oracle\_4U** as Password and Confirm Password. Then click **Next**.
- 8) On the Storage Options page, specify ASM as the storage type and choose the **+DATA** disk group as the storage location.
  - a) Select **Automatic Storage Management (ASM)** for Storage Type
  - b) The storage location defaults to Use Oracle-managed Files. Click the **Browse** button for Database Area.
  - c) In the Select Disk Group window, ensure that the **DATA** disk group is selected and click **OK**.

## **Practice 3-1: Creating an Oracle Database (continued)**

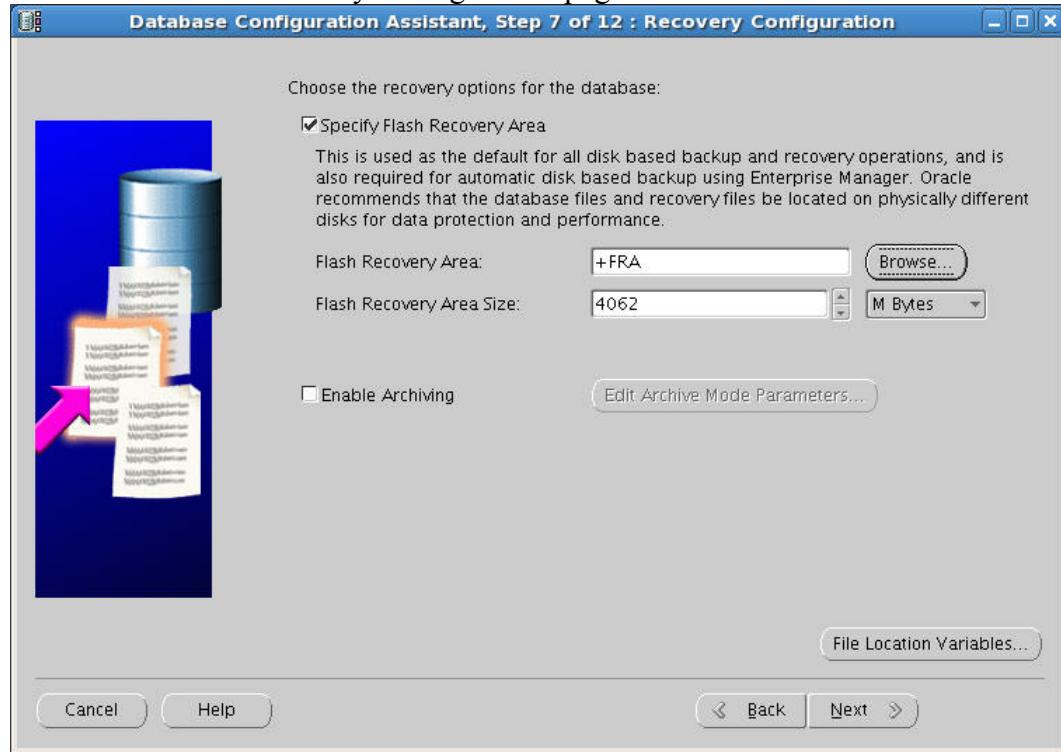
- d) Click **Next** on the Database File Locations page.



- e) The ASM Credentials window appears. Enter the password you specified during ASM installation and configuration (for your classroom environment this should be **oracle\_4U**) and click **OK**.
- 9) On the Recovery Configuration page, configure the Fast Recovery Area.  
**Note:** The Flash Recovery Area is now the Fast Recovery Area but in this release the pages in Enterprise Manager still refer to it as Flash Recovery Area. Watch for this to change in future releases as the product goes through this change.
- Select **Specify Flash Recovery Area**
  - Click the **Browse** button for Flash Recovery Area.
  - In the Select Disk Group window, select the **FRA** disk group and click **OK**.

## **Practice 3-1: Creating an Oracle Database (continued)**

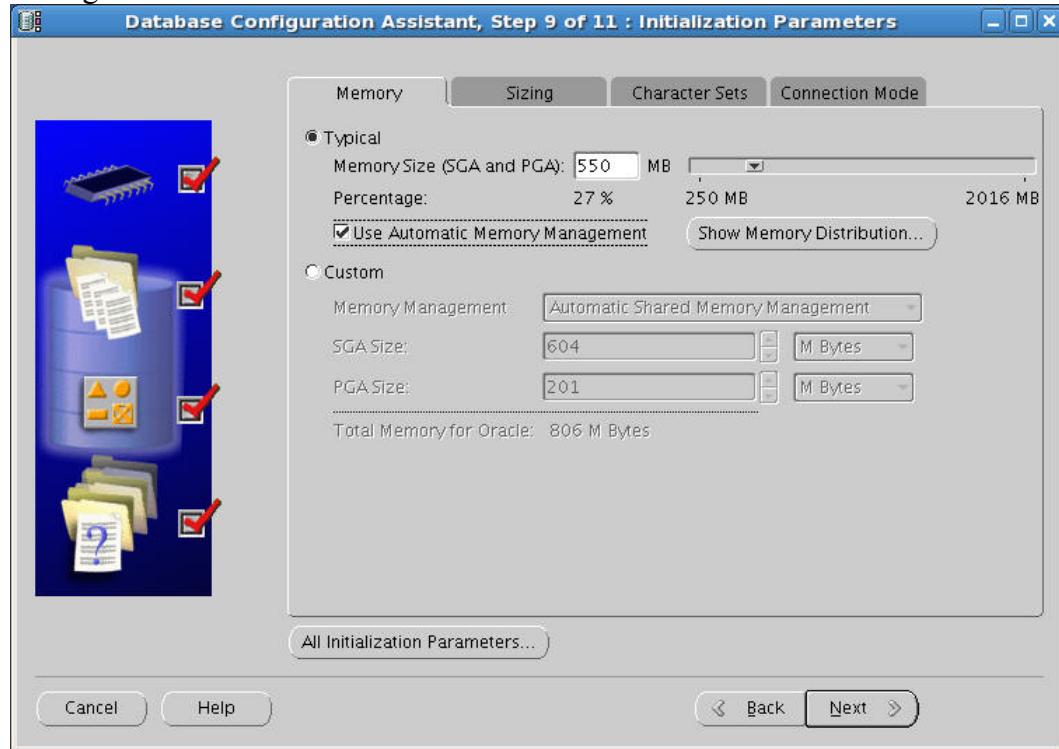
- d) Click **Next** on the Recovery Configuration page.



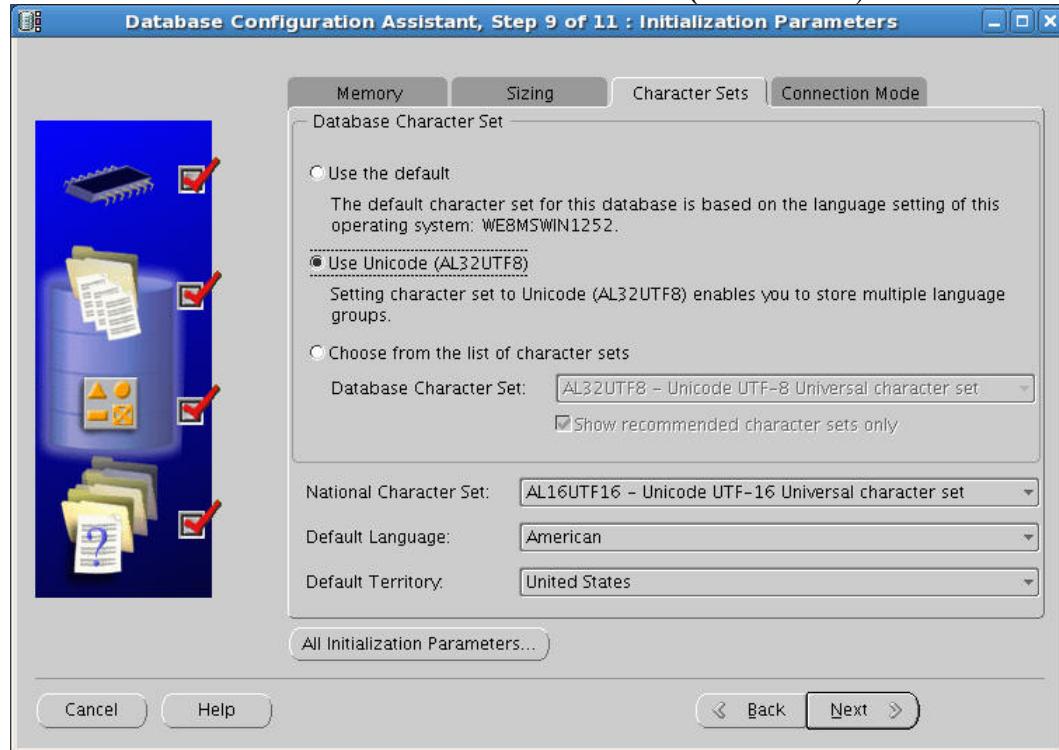
- 10) On the Database Content page, select **Sample Schemas**, and then click **Next**.
- 11) On the Memory tabbed page of the Initialization Parameters page, select **Typical** and specify a size of **550 MB** for Memory Size. Modify the character set to use **Unicode AL32UTF8**.

## **Practice 3-1: Creating an Oracle Database (continued)**

- a) Select **Typical** and set the value for **Memory Size (SGA and PGA)** to **550 MB**. Ensure **Automatic Memory Management** is selected for the Memory Management field.



- b) Click the Character Sets tab and select **Use Unicode (AL32UTF8)**.



### **Practice 3-1: Creating an Oracle Database (continued)**

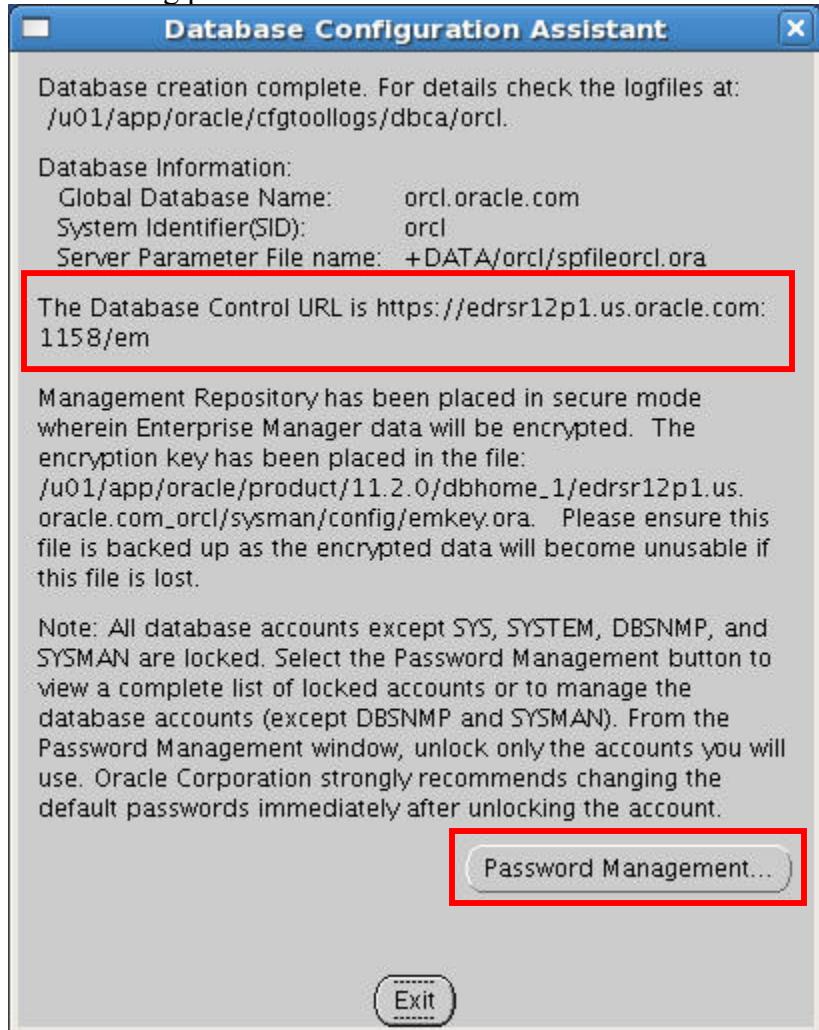
- c) Review the Sizing and Connection Mode tabbed pages, but do not change any values. Then click **Next**.
- 12) On the Database Storage page, review your file names and locations. Then click **Next**.
- 13) On the Creation Options page make the following selections:
  - a) Select **Create Database**.
  - b) Select **Save as a Database Template** option. Enter **orcl** as the Name for the database template and **orcl Database Template** as the Description.
  - c) Select **Generate Database Creation Scripts** and enter **/home/oracle/labs** as the Destination Directory.
  - d) Then click **Finish**.
- 14) The Confirmation page appears.
  - a) Review options and parameters, specifically the ones in the table below, and click **OK**.

| Name                   | Value    |
|------------------------|----------|
| Sample Schemas         | true     |
| db_block_size          | 8KB      |
| db_create_file_dest    | +DATA    |
| db_recovery_file_dest  | +FRA     |
| memory_target          | 550MB    |
| Database Character Set | AL32UTF8 |

- b) Click **OK** to acknowledge that the template has been created.
- c) Click **OK** to acknowledge the generation of the database scripts.

### **Practice 3-1: Creating an Oracle Database (continued)**

- 15) The DBCA displays the progress of the various installation steps. When the database itself has been created, the DBCA displays essential information about the database. Make note of this information. The Database Control URL will be used in several of the following practice sessions.



- a) **Important:** Make note of your Database Control URL here:

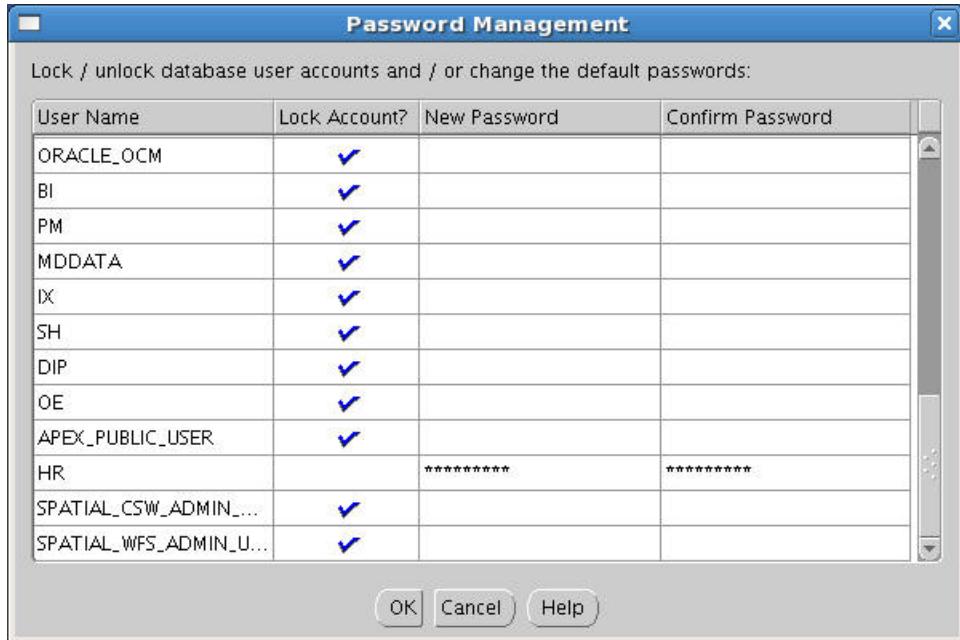
**https://\_\_\_\_\_ : \_\_\_\_\_/em**

You will be using this URL many times throughout the remainder of the course.

- b) Click the **Password Management** button.  
c) Scroll down the Password Management page until you see the **HR** username.

### **Practice 3-1: Creating an Oracle Database (continued)**

- d) Deselect **Lock Account?** and enter **oracle\_4U** as the New Password and Confirm Password. Then click **OK**.



- e) Click **Exit** to close the DBCA.

You have completed your task to create a database, a database template, and database generation scripts.

## **Practices for Lesson 4**

**Background:** You have just installed the Oracle software and created a database. You want to ensure that you can start and stop the database and see the application data.

## **Practice 4-1: Managing the Oracle Instance**

In this practice, you get to know the Oracle Enterprise Manager interface a little better. Using Oracle Enterprise Manager you perform the following tasks:

- View and change instance parameters
- Shut down the database
- Start up the database

You also view various instance parameters using SQL\*Plus and look the text version of the alert log from a terminal window.

- 1) Invoke Enterprise Manager, and log in as the **SYS** user. Which port number does this database use? You noted this in Practice 3.

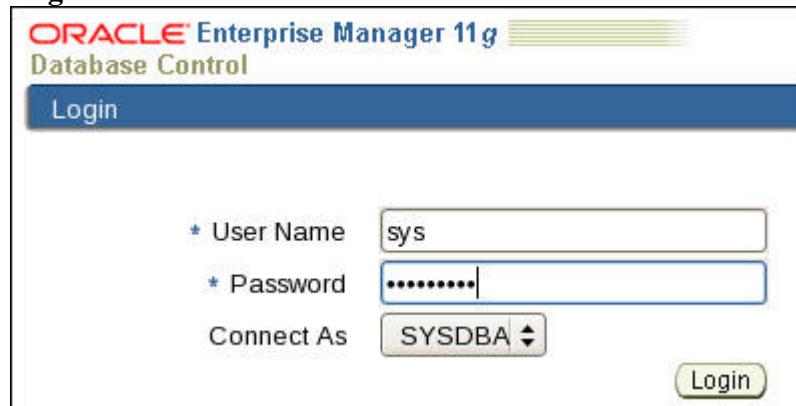
*Answer:* 1158

- a) Double-click the **Web Browser** icon on your desktop to open your Web browser as the **oracle** user.
- b) Enter the URL that you wrote down in Practice 3. It has the following format:

`https://hostname:portnumber/em`

**Note:** The first time you connect you will get a Secure Connection Failed message (or something similar) and an Alert window may appear. To get past this, you add an exception and accept the certificate.

- i) Click **OK** on the Alert window if it appears.
  - ii) Click the **Or you can add an exception...** link at the bottom of the page.
  - iii) A warning regarding adding exceptions appears. Click the **Add Exception...** button.
  - iv) On the Add Security Exception window, click the **Get Certificate** button.
  - v) The Certificate Status is displayed. Ensure that the option to permanently store this exception is selected and click the **Confirm Security Exception** button.
- c) In the Oracle Enterprise Manager login screen, enter **sys** as the User Name, enter **oracle\_4U** as the Password, and select **SYSDBA** for Connect As. Then click **Login**.



- 2) View the initialization parameters and set the **JOB\_QUEUE\_PROCESSES** parameter to **15**. What SQL statement is run to do this?

## Practice 4-1: Managing the Oracle Instance (continued)

- a) Select Server > Initialization Parameters (in the Database Configuration section).

**Database Instance: orcl.oracle.com**

|                                             |                             |                              |                                             |                        |                               |
|---------------------------------------------|-----------------------------|------------------------------|---------------------------------------------|------------------------|-------------------------------|
| <a href="#">Home</a>                        | <a href="#">Performance</a> | <a href="#">Availability</a> | <b>Server</b>                               | <a href="#">Schema</a> | <a href="#">Data Movement</a> |
| <b>Storage</b>                              |                             |                              | <b>Database Configuration</b>               |                        |                               |
| <a href="#">Control Files</a>               |                             |                              | <a href="#">Memory Advisors</a>             |                        |                               |
| <a href="#">Tablespaces</a>                 |                             |                              | <a href="#">Automatic Undo Management</a>   |                        |                               |
| <a href="#">Temporary Tablespace Groups</a> |                             |                              | <a href="#">Initialization Parameters</a>   |                        |                               |
| <a href="#">Datafiles</a>                   |                             |                              | <a href="#">View Database Feature Usage</a> |                        |                               |
| <a href="#">Rollback Segments</a>           |                             |                              |                                             |                        |                               |
| <a href="#">Redo Log Groups</a>             |                             |                              |                                             |                        |                               |

- b) Enter **job** in the Name field, and then click **Go**.

**Initialization Parameters**

|                                                                                                                                  |                              |          |         |          |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------|---------|----------|
| <input checked="" type="radio"/> Current                                                                                         | <input type="radio"/> SPFile |          |         |          |
| The parameter values listed here are currently used by the running instance(s). You can change static parameters in SPFile mode. |                              |          |         |          |
| Name                                                                                                                             | Basic                        | Modified | Dynamic | Category |
| <input type="text" value="job"/>                                                                                                 | All                          | All      | All     | All      |
| Filter on a name or partial name                                                                                                 |                              |          |         |          |

- c) When the **JOB\_QUEUE\_PROCESSES** initialization parameter appears, change its value to **15**.
- d) Click **Show SQL** and note the SQL statement that is going to be run next.

Database Instance: orcl.oracle.com > Initialization Parameters > Logged in As SYS

**Show SQL**

Return

```
ALTER SYSTEM SET job_queue_processes = 15 SCOPE=MEMORY
```

- e) Click **Return**, and then click **Apply**.
- 3) *Question:* What is the significance of a check in the Dynamic column?  
*Answer:* A “dynamic” parameter can be modified while the database is running.
- 4) Shut down the database instance by using Enterprise Manager.
- In the Enterprise Manager browser session, click the **Database** tab.
  - Click the **Shutdown** button.
  - For Host Credentials, enter **oracle** as Username and **oracle** as Password.
  - Click **OK**. The Startup/Shutdown: Confirmation page appears.
  - Click **Advanced Options** to see the mode for shutting down, but do not change the mode; it should remain as “Immediate.”
  - Click **Cancel** to return to the previous page.
  - Click **Yes** to confirm the shutdown operation.
  - Click **Refresh**. If you see an error during the refresh, click **OK** and continue to refresh. The error will resolve itself.

## **Practice 4-1: Managing the Oracle Instance (continued)**

- i) Note that the Status of the instance is now “Down.”

The screenshot shows the 'Database Instance' page in Oracle Enterprise Manager. A red arrow points to the 'Status' field, which is set to 'Down'. The 'Host' is 'edrsr12p1.us.oracle.com', 'Port' is '1521', 'SID' is 'orcl', and 'Oracle Home' is '/u01/app/oracle/product/11.2.0/dbhome\_1'. The 'Details' section states: 'There has been a user-initiated shutdown.' There are 'Startup' and 'Perform Recovery' buttons at the top right.

- 5) Using SQL\*Plus, verify that you are *not* able to connect as the HR user to a database that has been shut down.
- In the Linux command window set your environment to the **orcl** database using **oraenv**.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

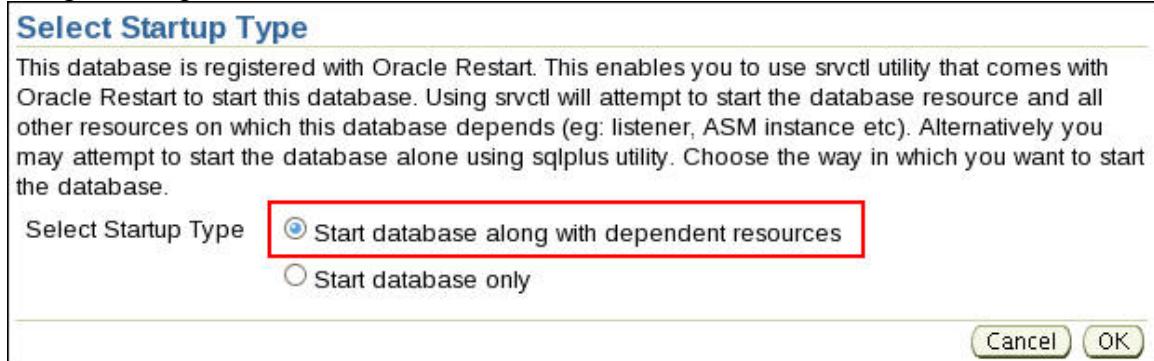
- Enter the following to attempt to log in to the database:

```
$ sqlplus hr
```

- Enter **oracle\_4U** for the password.
  - Note the “ORACLE not available” error message.
  - Press **[Ctrl], [D]** to exit the username prompt.
- 6) Use Enterprise Manager to restart the database instance, and then log in as the **SYS** user again.
- In Enterprise Manager, click the **Startup** button.
  - Enter **oracle** for both Username and Password in the Host Credentials region.
  - Click **OK**.

## **Practice 4-1: Managing the Oracle Instance (continued)**

- d) The Select Startup Type page appears. Ensure the option to start the database along with dependent resources is selected and click **OK**.



- e) The Startup/Shutdown: Confirmation page appears.
- f) Click **Advanced Options** to see the modes and options available for starting up, but do not change the mode; the startup mode should remain as “Open”.
- g) Click **Cancel** to return to the previous page.
- h) Click **Yes** to confirm the startup operation.
- i) The Startup page appears as the database is starting up. Wait for the login page to appear, at which time you can log in as **SYS** user with the **oracle\_4U** password and the **SYSDBA** privilege.
- Note:** When you first connect you may see a Failed status for the Agent Connection to Instance. Wait a few minutes and this should go away and the database home page should appear.
- 7) In the alert log, view the phases that the database went through during startup. What are they?
- Select **Database > Related Links > Alert Log Contents**. Click **Go**.
  - Scroll through the log and review the phases of the database during startup. Your alert log may look different from this screenshot, based on different system activities.

|                                         |              |    |                                 |                                 |
|-----------------------------------------|--------------|----|---------------------------------|---------------------------------|
| Jul 10, 2009<br>5:44:48 AM<br>GMT+07:00 | NOTIFICATION | 16 | admin_ddl opixe:2994:4222364190 | ALTER DATABASE OPEN             |
| Jul 10, 2009<br>5:44:48 AM<br>GMT+07:00 | NOTIFICATION | 16 | admin_ddl opixe:3065:2802784106 | Completed: ALTER DATABASE MOUNT |

- Note that the modes that the database goes through during startup are **MOUNT** and **OPEN**.
- Locate and view the text version of the alert log.  
Connect to the database as the **system** user (password is **oracle\_4U**) using SQL\*Plus and query the **V\$DIAG\_INFO** view. To view the text-only alert log without the XML tags, complete these steps:
  - In the **V\$DIAG\_INFO** query results, note the path that corresponds to the **Diag Trace** entry.

```
SQL> select * from V$DIAG_INFO;
```

## **Practice 4-1: Managing the Oracle Instance (continued)**

```
INST_ID NAME
-----
VALUE
-----
...
1 Diag Trace
/u01/app/oracle/diag/rdbms/orcl/orcl/trace
...
```

- ii) Exit from SQL\*Plus and change directory to that path.

```
$ cd /u01/app/oracle/diag/rdbms/orcl/orcl/trace
```

- iii) Open the **alert\_orcl.log** file with a text editor.

**Note:** The file will be named **alert\_<sid>.log** in other databases, where **<sid>** is the instance name.

- e) Try to locate the entries for the shutdown and startup performed earlier in the practice.

- 8) Connect to the database using SQL\*Plus as sysdba.

**Note:** Remember to use **oraenv** to set your environment to the **orcl** database if you have not already done so in your terminal window.

```
$ sqlplus / as sysdba
```

- 9) Use the **SHOW PARAMETER** command to verify the settings for **SGA\_MAX\_SIZE**, **DB\_CACHE\_SIZE**, and **SHARED\_POOL\_SIZE**.

```
SQL> show parameter sga_max_size
NAME                           TYPE        VALUE
-----
sga_max_size                   big integer 552M
SQL> show parameter db_cache_size
NAME                           TYPE        VALUE
-----
db_cache_size                  big integer 0
SQL> show parameter shared_pool_size
NAME                           TYPE        VALUE
-----
shared_pool_size               big integer 0
SQL>
```

- 10) Check the value of **JOB\_QUEUE\_PROCESSES**.

## **Practice 4-1: Managing the Oracle Instance (continued)**

```
SQL> show parameter job_queue_processes
```

| NAME                | TYPE    | VALUE |
|---------------------|---------|-------|
| job_queue_processes | integer | 1000  |

```
SQL>
```

**Note:** Earlier in this practice, you changed the JOB\_QUEUE\_PROCESSES parameter to 15, but the scope of that change was for the running instance only. That change did not get saved in the SPFILE. So the next time you performed a shutdown and startup, the value reverted to the value in the SPFILE.

## **Practice 4-2: Testing Oracle Restart and Your Database**

In this practice, you test the Oracle Restart functionality by causing your database to crash and watching for Oracle Restart to restart your database.

- 1) Use Enterprise Manager to determine whether your `orcl` database instance is currently managed by Oracle Restart.
  - a) Go to the Home page by clicking the **Database** tab.
  - b) On the Home page, look at the **High Availability** section and see that Oracle Restart is **Enabled** for your database instance.
- 2) To determine the effect of Oracle Restart, kill the LGWR process of your `orcl` database instance. What do you observe?
  - a) Set your environment variables for your `orcl` database instance.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
Enter
```

- b) Enter `ps -ef | grep ora_lgwr_orcl` to find the process ID for the LGWR process for your database.

```
$ ps -ef | grep ora_lgwr_orcl
oracle  10478      1  0 10:54 ?          00:00:00 ora_lgwr_orcl
oracle  11371  24865  0 11:00 pts/3    00:00:00 grep
ora_lgwr_orcl
```

- c) Kill the LGWR using the `kill -9` command and the process ID you determined in the previous step. This will cause the instance to shut down.

```
$ kill -9 10478
```

- d) Enter `ps -ef | grep ora_lgwr_orcl` again to see if the LGWR process is restarted. Repeat this until you see that the LGWR has started again. Notice that the `ora_lgwr_orcl` process has a different process ID now than the process ID you used when issuing the `kill -9` command.

```
$ ps -ef | grep ora_lgwr_orcl
oracle  11849 11687  0 11:06 pts/3    00:00:00 grep
ora_lgwr_orcl
$ ps -ef | grep ora_lgwr_orcl
oracle  11855 11687  0 11:06 pts/3    00:00:00 grep
ora_lgwr_orcl
$ ps -ef | grep ora_lgwr_orcl
oracle  11946      1  0 11:06 ?          00:00:00 ora_lgwr_orcl
oracle  12034 11687  0 11:07 pts/3    00:00:00 grep
ora_lgwr_orcl
```

## **Practice 4-2: Testing Oracle Restart and Your Database (continued)**

- 3) Connect to the database using SQL\*Plus as sysdba to confirm that your database has restarted successfully. Query v\$instance to see the status of your database.  
**Note:** Remember to use oraenv to set your environment to the orcl database if you have not already done so in your terminal window.

```
$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.1.0 Production on Tue Aug 18 11:16:40
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> select status from v$instance;

STATUS
-----
OPEN

SQL>
```

## **Practices for Lesson 5**

**Background:** In these practices, you explore the benefits of the ASM Fast Mirror Resync feature. You also explore the functionality of the ASM command-line utility, ASMCMD.

## **Practice 5-1: ASM Fast Mirror Resync**

In this practice, you compare the time it takes to add an offlined disk following a non-data-loss issue. You compare the same operation once without using ASM Fast Mirror Resync, and once using it.

- 1) Determine the compatibility values for your existing ASM disk groups. What do you observe?
  - a) Set the proper environment variables for the +ASM instance. Run the query in the following screenshot to check COMPATIBLE values for both ASM and the database. You should see that the database compatibility value is set to 10.1.

```
$ . oraenv
ORACLE_SID = [orcl] ? +ASM
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is
/u01/app/oracle
$ sqlplus / as sysasm

SQL> select name,compatibility,database_compatibility from
v$asm_diskgroup;

NAME          COMPATIBILITY      DATABASE_COMPATIBILITY
-----          -----          -----
DATA           11.2.0.0.0          10.1.0.0.0
FRA            11.2.0.0.0          10.1.0.0.0
```

- 2) Using Enterprise Manager, navigate to the **DATA** disk group page.
  - a) Connect to Enterprise Manager Database Control as user **SYS** using the URL that was given during the previous lab. For example:  
**https://edrsr12p1.us.oracle.com:1158/em/**
  - b) Click the **+ASM** link on the main Database page.
  - c) On the ASM home page, click the **Disk Groups** tab.
  - d) On the Automatic Storage Management Login page, enter **sys** in the Username field and **oracle\_4U** in the Password field, and select **SYSASM** from the Connect As drop-down list. Select the **Save as Preferred Credentials** check box. Then click **Login**.
  - e) On the Disk Groups page, click the **DATA** link in the table.
- 3) Using Enterprise Manager Database Control, change the Database compatibility attribute of the **DATA** disk group. Set it to **11.2.0.0.0**.
  - a) On the Disk Group: DATA General subpage, click **Edit** in the Advanced Attributes section.
  - b) On the Edit Advanced Attributes for Disk Group: DATA page, enter **11.2.0.0.0** for the Database Compatibility. Then click **OK**.

## **Practice 5-1: ASM Fast Mirror Resync (continued)**

- c) Navigate back to the **Disk Group: DATA General** subpage. Make sure that you see that the Database Compatibility field was updated. You should also see that disks are around 40% full.
  - d) Attempt to change the Database Compatibility back to version **10.1.0.0.0**. What do you observe?
- 4) Use SQL\*Plus to verify that the previous update was done correctly:
- a) From a terminal window, connected as the user **oracle**, launch SQL\*Plus and look at **V\$ASM\_DISKGROUP**:

```
$ . oraenv
ORACLE_SID = [orcl] ? +ASM
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is
/u01/app/oracle
$ sqlplus / as sysasm
SQL> select name,compatibility,database_compatibility from
v$asm_diskgroup;

NAME          COMPATIBILITY   DATABASE_COMPATIBILITY
-----          -----          -----
DATA           11.2.0.0.0       11.2.0.0.0
FRA            11.2.0.0.0       10.1.0.0.0
```

- b) Exit SQL\*Plus when finished.
- 5) Execute the **lab\_05\_01\_05.sh** script from the **labs** directory to set up the environment for this practice. The script creates a new tablespace called **TBSJMW** in the **DATA** disk group using a 50 MB file. It then creates a new table called **SYSTEM.JMW** residing in this new tablespace. The script then inserts some rows in the newly created table.

```
$ cd ~/labs
$ ./lab_05_01_05.sh
ORACLE_SID = [oracle] ? The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle

SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 29 04:43:05
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options
```

## **Practice 5-1: ASM Fast Mirror Resync (continued)**

```
SQL> SQL> SQL> SQL>
Tablespace created.

SQL> SQL> drop table jmw purge
*
ERROR at line 1:
ORA-00942: table or view does not exist

SQL> SQL>
Table created.

SQL> SQL>
1 row created.

SQL> SQL>
Commit complete.

SQL> SQL> 2      3      4      5      6      7
PL/SQL procedure successfully completed.

SQL> SQL> Disconnected from Oracle Database 11g Enterprise
Edition Release 11.2.0.1.0 - Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options
$
```

- 6) Offline the second disk that is part of the DATA disk group making sure that the Disk Repair Time attribute is set to 0:
  - a) Navigate back to the **Disk Group: DATA General** page. Select the second disk (**ASMDISK02**), and click **Offline**.
  - b) On the Confirmation page, change the Disk Repair Time from its default (**3.6 hours**) to **0.0** and click **Show SQL**.

```
ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h
```

- c) Click **Return**.
- d) Navigate back to the Confirmation page. Click **Yes**.
- 7) What do you observe?
  - a) Navigate back to the **Disk Group: DATA General** page. You can see that ASMDISK02 is now offline. Refresh your browser page until you no longer see the offline disk. It will be renamed to something similar to this:  
**\_DROPPED\_0000\_DATA**  
The Pending Operations will show 1 as the disk is being dropped. Click the 1 to view the progress of the rebalance operation.

## **Practice 5-1: ASM Fast Mirror Resync (continued)**

- b) Navigate back to the **Disk Group: DATA General** page. You should now see that all three of the remaining disks are around 54% full. This forced the lost mirrored extents to be rebalanced across surviving disks.
- 8) Modify some rows in the **SYSTEM.JMW** table (delete 499 rows). Is it working?
- a) You can still modify the JMW table:

```
$ . oraenv
ORACLE_SID = [+ASM] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus system
Enter password: oracle_4U

SQL> delete from system.jmw where rownum<500;

499 rows deleted.

SQL> commit;
```

- 9) Add the dropped ASM disk back to the DATA disk group:
- a) You now need to wipe out the dropped disk before you can add it back. You must be root to do this:
- ```
# oracleasm listdisks
# oracleasm deletedisk ASMDISK02
# oracleasm createdisk ASMDISK02 /dev/xvdc
```
- b) Navigate back to the **Disk Group: DATA General** page. Click **Add**.
- c) On the Add Disks page, select **ORCL:ASMDISK02** from the Candidate Member Disks table. Set REBALANCE POWER to **11**.
- d) Click Show SQL.

```
ALTER DISKGROUP DATA ADD DISK 'ORCL:ASMDISK02' SIZE 2304 M
REBALANCE POWER 11
```

- e) Click **Return**.
- f) On the Add Disks page, click **OK**.
- 10) What do you observe?
- a) Navigate back to the **Disk Group: DATA General** page. Click the **Pending Operations 1** link to monitor the rebalancing operation.
- b) You can see that a rebalance operation is going on for a while.
- c) Allow the rebalance to complete. This may take several minutes.

## **Practice 5-1: ASM Fast Mirror Resync (continued)**

- 11) Take the second disk, which is part of the DATA disk group, offline, making sure that the Disk Repair Time attribute is set to its default value of **3.6** hours. Modify the **SYSTEM.JMW** table again (delete another batch of 499 rows). What are your observations?
- Navigate back to the **Disk Group: DATA General** page. Select the second disk (**ASMDISK02**), and click **Offline**.
  - On the Confirmation page, leave the default value of **3.6 Hours** in the Disk Repair Time field, and click **Yes**.
  - Navigate back to the **Disk Group: DATA General** page. You can see that **ASMDISK02** is not empty. Even if you refresh your browser page, no rebalance is taking place.
  - You can still modify the **SYSTEM.JMW** table.

```
$ . oraenv
ORACLE_SID = [+ASM] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus system
Enter password: oracle_4U

SQL> delete from system.jmw where rownum<500;

SQL> commit;
```

- 12) Now, how would you add the offlined disk back into the DATA disk group? It is not necessary to wipe out the dropped disk.
- Navigate back to the **Disk Group: DATA General** page. Select the offline disk and click **Online**.
  - On the Confirmation page, click **Yes**.
  - Navigate back to the **Disk Group: DATA General** page. You should see the disk back to its level (around 41% full), without the need of any rebalance operation. The disk is added back immediately.

## **Practice 5-2: Using ASMCMD**

In this practice, you use ASMCMD commands to manage diskgroups.

- 1) Start ASMCMD and view the contents of the **+DATA** diskgroup. Get a listing of the **DATAFILE** directory.

```
$ . oraenv
ORACLE_SID = [orcl] ? +ASM
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is
/u01/app/oracle
$ asmcmd
ASMCMD> ls +DATA/*
+DATA/ASM/:
ASMPARAMETERFILE/

+DATA/ORCL/:
CONTROLFILE/
DATAFILE/
ONLINELOG/
PARAMETERFILE/
TEMPFILE/
Spfileorcl.ora

ASMCMD> ls +DATA/ORCL/DATAFILE
EXAMPLE.260.630800437
SYSAUX.257.628766309
SYSTEM.256.628766309
TBSJMW.269.628767357
UNDOTBS1.258.628766309
USERS.259.628766309
```

- 2) Using ASMCMD, generate a list of all the commands that are allowed with the **help** command.

```
ASMCMD> help
```

- 3) Navigate to the **CONTROLFILE** directory of the **ORCL** database in the **DATA** disk group and use ASMCMD to copy the current control file to the **/tmp** directory. Use the **help cp** command for syntax guidance.

```
ASMCMD> cd +DATA/ORCL/CONTROLFILE
ASMCMD> ls
Current.260.692183799
ASMCMD> help cp
ASMCMD> cp Current.260.692183799 /tmp
copying +DATA/ORCL/CONTROLFILE/Current.260.692183799 ->
/tmp/Current.260.692183799
```

## **Practice 5-2: Using ASMCMD (continued)**

- 4) Attempt to remove the current control file. Use the **help rm** command for guidance on syntax.

**Note:** It is important that the ORCL database instance is currently running and the **DATA** disk group is mounted.

```
ASMCMD> help rm
ASMCMD> rm Current.260.692183799
ORA-15032: not all alterations performed
ORA-15028: ASM file
'+DATA/ORCL/CONTROLFILE/Current.260.692183799' not dropped;
currently being accessed (DBD ERROR: OCISstmtExecute)
```

- 5) Determine the syntax for the **lsdg** command, and generate a list of all disk groups.

```
ASMCMD> help lsdg
ASMCMD> lsdg
State      Type      Rebal      Sector      Block          AU      Total_MB
Free_MB   Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    NORMAL    N            512      4096  1048576      13824
10269           600                  4834          0
N  DATA/
MOUNTED    EXTERN    N            512      4096  1048576      9216
8982           0                  8982          0
N  FRA/
```

- 6) Determine the syntax for the **mkdg** command, and create a new disk group named **DATA2** of type **external** redundancy, using two disks: **ORCL:ASMDISK11** and **ORCL:ASMDISK12**. Verify the disk group created successfully.

```
ASMCMD> help mkdg
ASMCMD> mkdg <dg name="DATA2" redundancy="external"> <dsk
string="ORCL:ASMDISK11" /> <dsk string="ORCL:ASMDISK12" />
</dg>
ASMCMD> lsdg
State      Type      Rebal      Sector      Block          AU      Total_MB
Free_MB   Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    NORMAL    N            512      4096  1048576      13824
10269           600                  4834          0
N  DATA/
MOUNTED    EXTERN    N            512      4096  1048576      4608
4556           0                  4556          0
N  DATA2/
MOUNTED    EXTERN    N            512      4096  1048576      9216
8982           0                  8982          0
N  FRA/
```

## **Practice 5-2: Using ASMCMD (continued)**

- 7) Determine the syntax for the **dropdg** command, and drop the **DATA2** disk group created in the last step. Verify the result.

```
ASMCMD> help dropdg
ASMCMD> dropdg DATA2
ASMCMD> lsdg
State      Type    Rebal   Sector   Block       AU  Total_MB
Free_MB   Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED   NORMAL   N          512    4096  1048576     13824
10269           600                  4834            0
N  DATA/
MOUNTED   EXTERN   N          512    4096  1048576     9216
8982           0                  8982            0
N  FRA/
```

## **Practices for Lesson 6**

**Background:** In this practice you configure connectivity between your machine and a database on one of your classmate's machines. You also configure and test an additional listener. This practice is entirely for educational purposes and no future practices rely on successful completion of this practice.

## **Practice 6-1: Configuring the Oracle Network to Access Another Database**

Configure your network environment so that you can connect to a partner's orcl database. Use local naming and create a new network service name called testorcl that maps to your partner's orcl database. Test your network changes by attempting to connect to your partner's database using the testorcl service name.

- 1) Make a copy of your **tnsnames.ora** file. It is in your database \$ORACLE\_HOME/network/admin directory.
  - a) In a terminal window use oraenv to set your environment to your database home.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

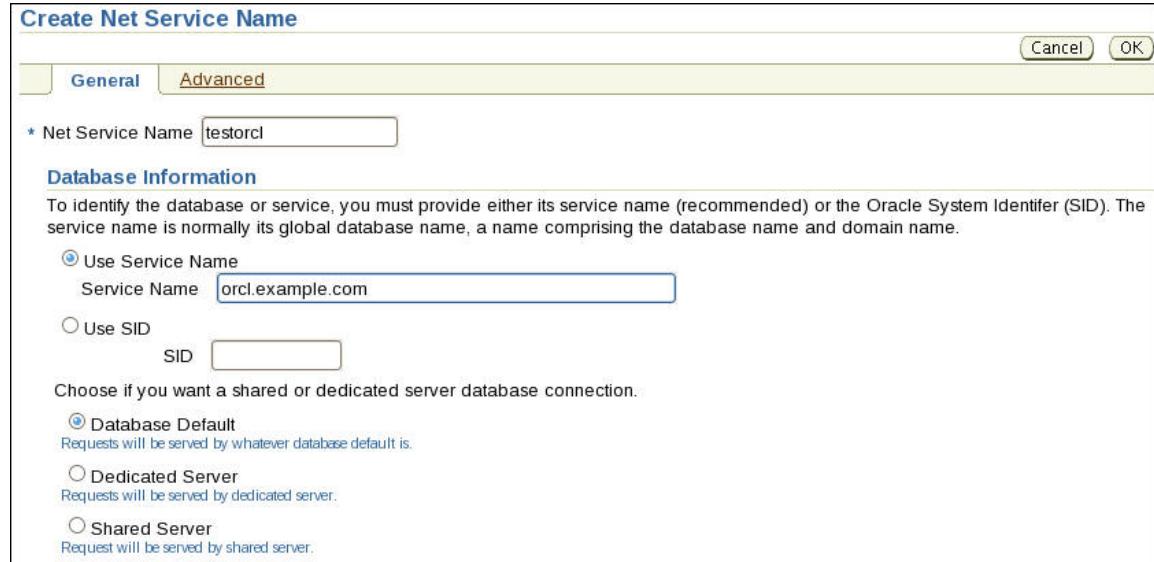
- b) Enter **cd \$ORACLE\_HOME/network/admin** to navigate to the **/u01/app/oracle/product/11.1.0/db\_1/network/admin** directory.
  - c) Enter **cp tnsnames.ora tnsnames.old** to create a copy of the **tnsnames.ora** file.
  - d) Enter **ls -l**, if you want to see the copy and its privileges in your directory.
- 2) Navigate to the **Net Services Administration** page. Start by clicking the **Listener** link on the Database home page.
  - a) Invoke Enterprise Manager as the **SYS** user in the **SYSDBA** role for your **orcl** database.
  - b) On the Database Instance – Home page, click the **Listener** link in the **General** region.
  - c) In the **Related Links** region, click **Net Services Administration**.
- 3) Modify your local Names Resolution file so that you can connect to another database. Name the connection to a partner's orcl database **testorcl**.
  - a) On the **Net Services Administration** page, select **Local Naming** from the Administer drop-down list, and then click **Go**.
  - b) The Netservices Administration: Host Login page appears. If you previously saved the **oracle** username and **oracle** password as preferred credentials for your host login, they appear on the screen. If not, enter **oracle** as Username and Password, select the **Save as Preferred Credential** check box, and then click **Login**.
  - c) On the **Local Naming** page, click **Create** to enter a new network service name.
  - d) Enter **testorcl** as Net Service Name.

## **Practice 6-1: Configuring the Oracle Network to Access Another Database (continued)**

- e) Select **Use Service Name**, and enter **orcl.example.com** as Service Name.

**Note:** You can also choose to enter a SID by selecting the Use SID option. In this case, you must enter **orcl**.

- f) Select **Database Default**.



The screenshot shows the 'Create Net Service Name' dialog box. The 'General' tab is selected. The 'Net Service Name' field contains 'testorcl'. The 'Service Name' field contains 'orcl.example.com'. Under 'Database Information', the 'Use Service Name' radio button is selected, and the 'Service Name' dropdown is set to 'orcl.example.com'. The 'Database Default' radio button is selected under 'Choose if you want a shared or dedicated server database connection'.

- g) Click **Add** in the **Addresses** region.

- h) On the Add Address page, specify the following values:

Option	Value
Protocol	TCP/IP
Port	1521
Host	<Your partner's host name or IP address—for example, <b>edrsr25p1.us.oracle.com</b> or <b>139.185.35.125</b> >



The screenshot shows the 'Add Address' dialog box. The 'Protocol' dropdown is set to 'TCP/IP', 'Port' is 1521, and 'Host' is 'edrsr25p1.us.oracle.com'. Below these fields, the 'Advanced Parameters' section is visible, containing fields for 'Total Send Buffer Size' and 'Total Receive Buffer Size'.

- i) Click **OK** to return to the Create Net Service Name properties page.

- j) Click **OK**.

The Creation Message appears: Net Service “testorcl” created successfully.

## **Practice 6-1: Configuring the Oracle Network to Access Another Database (continued)**

- 4) In Enterprise Manager, test access to your partner's orcl database as the **system** user with the **oracle\_4U** password by using the **testorcl** Local Naming.

- a) Select **testorcl** on the Local Naming page, and then click **Test Connection**.

The message "Test Connection To Net Service Name: testorcl" appears.

- b) Enter **system** as Username and **oracle\_4U** as Password, and then click **Test**.

The Processing page displays status information. It is followed by a success message. *If you receive any errors or warnings, resolve them.*



Click **OK** after the test is completed.

- 5) Test your changes to the network configuration using SQL\*Plus. Enter **system@testorcl** and then enter **oracle\_4U** when prompted for the password. To see your partner's information, select the **instance\_name** and **host\_name** columns from the **v\$instance** table.

- a) Ensure your environment is set for the orcl database by running oraenv.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

## **Practice 6-1: Configuring the Oracle Network to Access Another Database (continued)**

- b) In a terminal window, enter:

```
$ sqlplus system@testorcl

SQL*Plus: Release 11.2.0.1.0 Production on Fri Jul 10 11:07:11
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL>
```

The Oracle SQL\*Plus window opens. *If you receive any errors or warnings, resolve them.*

- c) At the SQL> prompt, enter the following command:

```
SQL> select instance_name, host_name from v$instance;

INSTANCE_NAME
-----
HOST_NAME
-----
orcl
edrsr25p1.us.oracle.com
```

## **Practice 6-2: Creating an Alternate Listener**

In this practice, you create a second listener, called LISTENER2, using Enterprise Manager.

- 1) Create a new listener called LISTENER2. Use port 1561 for this listener.
  - a) Log in to Enterprise Manager as the **SYS** user in the **SYSDBA** role. On the Database Instance – Home page, click the **Listener** link in the **General** region.
  - b) In the **Related Links** region, click **Net Services Administration**.
  - c) On the Net Services Administration page, select **Listeners** from the **Administer** drop-down list, and then click **Go**. Enter host credentials as **oracle** and **oracle** for username and password, and then click **Login**.
  - d) On the Listeners page, which gives you an overview of the existing listeners, click the **Create** button.  
The Create Listener page appears.
  - e) Enter **LISTENER2** as Listener Name, and then click **Add** to add a listener address.
  - f) Enter or confirm the following values:

Option	Value
Protocol	TCP/IP
Port	1561
Host	<Your computer's host name—for example, <b>edrsr12p1.us.oracle.com</b>

- g) Click **OK**.
- h) Click the **Static Database Registration** tab.



The screenshot shows the 'Create Listener' dialog box. The 'Static Database Registration' tab is selected and highlighted with a red box. The 'Listener Name' field contains 'LISTENER2'. The 'Addresses' section shows a table with one row: Protocol TCP/IP, Host edrsr12p1.us.oracle.com, and Port 1561. Buttons for 'Cancel', 'OK', 'Edit', 'Remove', and 'Add' are visible.

- i) Click the **Add** button to connect the new listener with your **orcl** database.
- j) Enter the following values:

Option	Value
Service Name	<b>orcl</b>
Oracle Home Directory	/u01/app/oracle/product/11.2.0/dbhome_1
Oracle System Identifier	<b>orcl</b>

## Practice 6-2: Creating an Alternate Listener (continued)

Option	Value
(SID)	

Add Database Service

<input type="button" value="Cancel"/>	<input type="button" value="OK"/>
* Service Name <input type="text" value="orcl"/>	
* Oracle Home Directory <input type="text" value="/u01/app/oracle/product/11.1.0/db_1"/>	
* Oracle System Identifier (SID) <input type="text" value="orcl"/>	

- k) Click **OK** to add the database service.
- l) Click **OK** to create the LISTENER2 listener.

**i Creation Message**

Listener "LISTENER2" created successfully.

**Listeners: /u01/app/oracle/product/11.1.0/db\_1/network/admin**

A listener process is identified by the listening end-points ('Host' and 'Port'), along with the other parameters like, logging and tracing levels, log/trace directories etc. All these parameters are defined in the "Listener Parameter File" (listener.ora). This page shows the status of a listener as "Started" only when the listener is running, and has been started using the "Listener Parameter File" at the same location as shown above.

Listener Name	<input type="text"/>	<input type="button" value="Go"/>	<input type="button" value="Create"/>
<input type="button" value="Edit"/> <input type="button" value="Delete"/> <input type="button" value="Actions"/> <input type="button" value="Start/Stop"/> <input type="button" value="Go"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<b>Protocol Details</b>	Status
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Protocol <b>TCP/IP</b>	Not a target
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Host <b>edrsr12p1.us.oracle.com</b>	Stopped
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Port <b>1561</b>	Not a target

## **Practice 6-2: Creating an Alternate Listener (continued)**

- 2) Start the **LISTENER2** listener.
  - a) Confirm that the **LISTENER2** listener and **Start/Stop** Actions are selected, and then click **Go**.
  - b) Click **OK** on the Start/Stop page.  
A confirmation message appears with a **View Details** link.
  - c) Optionally, click the **View Details** link, review the listener status information, and use the **Back** icon of your browser to return to the previous page.
- 3) Check the status of the new listener and test the new listener.
  - a) Ensure your environment is set for the **orcl** database by running **oraenv**.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

- b) Issue the following commands at the command prompt

```
$ lsnrctl status LISTENER2
```

- c) Connect to your database using the new listener using an easy connect string.  
**Note:** This method of connecting is not a recommended approach for a production environment; it is being used in this simple classroom environment just to prove the newly created listener works.

```
$ sqlplus hr/oracle_4U@your_ip_address:1561/orcl
```

Your connection is through your newly created listener. Exit SQL\*Plus after you complete this step.

- 4) You can now stop this new LISTENER2 because you do not need it for the remainder of the course.

```
$ lsnrctl stop LISTENER2
```

## **Practices for Lesson 7**

**Background:** You need to view existing storage structure information and create a new tablespace for the INVENTORY application. You also need to create a database user to perform all administrative tasks without using the SYS and SYSTEM accounts.

**Note:** Because the creation of users has not been covered, a script is provided for this practice.

## **Practice 7-1: Viewing Database Storage Structure Information**

In this practice, you examine existing storage structure information for your database. Before you begin, you run a script that creates a new user DBA1 that will be used for your DBA tasks from now on. You must configure this user in Enterprise Manager to be one of the Administrators.

- 1) Run the **lab\_07\_01\_01.sh** script that creates a directory that will be used later and the DBA1 user. It is located at **/home/oracle/labs**. The password for DBA1 is **oracle\_4U**.
  - a) If you do not have a terminal window open from previous practices, open one now by right-clicking on your desktop and selecting **Open Terminal**.
  - b) Ensure your environment variables are set appropriately so that you can connect to your **orcl** database.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
```

- c) Change the current directory to the **labs** directory by entering:

```
$ cd labs
```

- d) Enter the following command to run the script that creates the DBA1 user:

```
$ ./lab_07_01_01.sh
```

- e) Leave the terminal window open. You will use it again later.
- 2) Use the Setup link in the top-right corner of Enterprise Manager (EM) to define the **DBA1** user as one who can perform administrative tasks in EM. When the non-SYS user is configured, log out as the **SYS** user and log in as the **DBA1** user. Use the **DBA1** user to perform the rest of these tasks, unless otherwise indicated.
  - a) In the far top-right corner of the EM window, click **Setup** and then on the Setup page select **Administrators**.



- b) Click **Create** to add the DBA1 user to the Administrators list. This will enable the DBA1 user to perform management tasks by using Enterprise Manager.

## Practice 7-1: Viewing Database Storage Structure Information (continued)

The screenshot shows the 'Administrators' section of the Oracle Enterprise Manager interface. At the top, it says 'Administrators are database users who can login to Enterprise Manager to perform management tasks like set Blackouts, email notification schedules.' Below this is a search bar and a toolbar with 'View', 'Edit', 'Subscribe to Rules', 'Delete', and 'Create' buttons. The 'Create' button is highlighted with a red box. The main area is titled 'Select Name' and shows three entries: 'SYS' (Super Administrator), 'SYSMAN' (Repository Owner), and 'SYSTEM' (Super Administrator). To the right of each entry is a column titled 'Access'.

- c) Enter **dba1** as Name and leave Email Address blank. Select **Super Administrator** for the Administrator Privilege and then click **Review**.

The screenshot shows the 'Create Administrator: Properties' dialog. It has fields for 'Name' (set to 'dba1') and 'E-mail Address' (empty). Below these is a note about creating a default notification schedule. Under 'Administrator Privilege', a dropdown menu is open, showing 'Super Administrator' selected. A checkbox for 'Grant SELECT\_CATALOG\_ROLE' is checked. The 'Review' button is visible at the top right.

- d) On the Create Administrator dba1: Review page, click **Finish**.  
e) Now that there is a non-SYS user, click **Logout** in the top-right corner, and then click **Login**.  
f) Enter **dba1** as User Name and **oracle\_4U** as Password, and select **SYSDBA** as Connect As. Then click **Login**.

The Database Home page appears.

- 3) Using Enterprise Manager, view information about the **EXAMPLE** tablespace. Answer the following questions about it:

- a) *Question 1:* What percentage of free space can be used up before the Warning threshold is reached?  
i) In Enterprise Manager, select **Server > Storage > Tablespaces**.  
ii) Click the **EXAMPLE** tablespace name.

*Answer:* 85%

The screenshot shows the 'Tablespace Full Metric Thresholds' page for the 'EXAMPLE' tablespace. It displays the 'Space Used (%)' metric. A note says 'This tablespace is using the database default space used thresholds.' Below this, a table shows the thresholds: 'Warning (%)' is 85, and 'Critical (%)' is 97. The 'Warning (%)' value is highlighted with a red box.

- b) *Question 2:* How many segments are there in the **EXAMPLE** tablespace?  
i) From the **Actions** drop-down list, select **Show Tablespace Contents**, and then click **Go**.

## Practice 7-1: Viewing Database Storage Structure Information (continued)

- ii) The Show Tablespace Contents page appears.

*Answer:* 420 (Your answer may vary.)

**Segments**

**Search**

Segment Name	Type	Minimum Size (KB)	Minimum Extents
SH.CUSTOMERS	TABLE	12,288	27
PM.SYS_LOB0000073976C00034\$\$	LOBSEGMENT	5,120	20
SH.SUPPLEMENTARY_DEMOGRAPHICS	TABLE	4,096	19
PM.SYS_LOB0000073976C00054\$\$	LOBSEGMENT	4,096	19
OE.PRODUCT_DESCRIPTIONS	TABLE	3,072	18
SH.SALES.SALES_Q4_2001	TABLE PARTITION	2,048	17
SH.SALES.SALES_Q1_1999	TABLE PARTITION	1,024	16
SH.SALES.SALES_Q3_2001	TABLE PARTITION	1,024	16
SH.CUSTOMERS_PK	INDEX	1,024	16
SH.SALES.SALES_Q3_1999	TABLE PARTITION	960	15

Previous 1-10 of 420 Next 10

- c) *Question 3:* Which index in the EXAMPLE tablespace takes up the most space?
- Select INDEX from the Type drop-down list in the Search region, and then click Go.
  - Notice the Size column is the sort column and that it is sorted in descending order.

**Segments**

**Search**

Segment Name	Type	Minimum Size (KB)	Minimum Extents
SH.CUSTOMERS_PK	INDEX	1,024	16
OE.PROD_NAME_IX	INDEX	512	8
OE.PRD_DESC_PK	INDEX	320	5
SH.CUSTOMERS_YOB_BIX	INDEX	192	3
SH.TIMES_PK	INDEX	128	2

Previous 1-10 of 78 Next 10

*Answer:* SH.CUSTOMERS\_PK

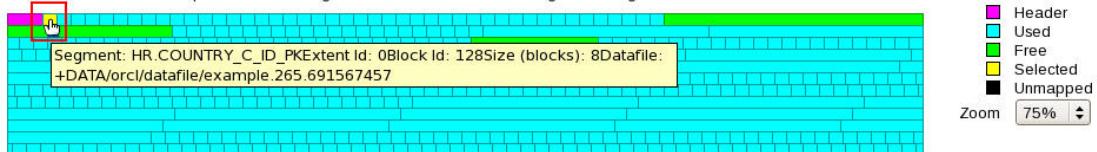
- d) *Question 4:* Which segment is stored physically first in the tablespace? That is, which one is stored right after the tablespace header?
- Scroll to the bottom of the page, and then click the plus icon to the left of the Extent Map label.

## **Practice 7-1: Viewing Database Storage Structure Information (continued)**

- ii) After several seconds, the extent map appears. Note that the map legend indicates that pink is the tablespace header.
- iii) Scroll back to the top of the page, select **All Types** from the **Type** drop-down list, and then click **Go**.
- iv) Click the extent just to the right of the tablespace header extent (the extent will turn yellow to show that it is selected). Notice that if you move the cursor over the segment, it tells you the name of the segment stored in that location.

### **Extent Map**

Clicking the Highlight Extents button for a segment in the table will cause all extents that belong to that segment to be highlighted in the Extent Map. Clicking on a used extent in the Extent Map will select the segment to which that extent belongs in the segment table.



- v) Scroll to the top of the page again, and note the segment that is being pointed to:

Previous 10 121-130 of 420 Next 10				
Highlight Extents	Segment Name	Type	Size (KB)	Extents
<input type="radio"/>	SH.COSTS.COSTS_Q1_2003	TABLE PARTITION	64	<a href="#">1</a>
<input type="radio"/>	SH.COSTS.COSTS_Q2_2003	TABLE PARTITION	64	<a href="#">1</a>
<input type="radio"/>	SH.COSTS.COSTS_Q3_2003	TABLE PARTITION	64	<a href="#">1</a>
<input type="radio"/>	SH.COSTS.COSTS_Q4_2003	TABLE PARTITION	64	<a href="#">1</a>
<input type="radio"/>	HR.REG_ID_PK	INDEX	64	<a href="#">1</a>
<input checked="" type="radio"/>	HR.COUNTRY_C_ID_PK	INDEX	64	<a href="#">1</a>
<input type="radio"/>	HR.LOC_ID_PK	INDEX	64	<a href="#">1</a>
<input type="radio"/>	HR.LOC_CITY_IX	INDEX	64	<a href="#">1</a>
<input type="radio"/>	HR.LOC_STATE_PROVINCE_IX	INDEX	64	<a href="#">1</a>
<input type="radio"/>	HR.LOC_COUNTRY_IX	INDEX	64	<a href="#">1</a>

*Answer: HR.COUNTRY\_C\_ID\_PK*

## **Practice 7-2: Creating a Tablespace**

In this practice, you create the Inventory tablespace that will be used in a later practice.

- 1) Create a new, locally managed tablespace (LMT) called **INVENTORY** of size **5 MB**.
  - a) In Enterprise Manager, select **Server > Storage > Tablespaces**.
  - b) Click **Create**.
  - c) Enter **INVENTORY** as the tablespace name, and verify that Extent Management is **Locally Managed**, Type is **Permanent**, Status is **Read Write**, and Use bigfile tablespace is not selected.
  - d) Click **Add** in the Datafiles region.
  - e) On the Add Datafile page, select **Automatic Storage Management** for Storage Type, ensure that **DATA** is selected for DiskGroup, and enter **5 MB** as File Size. Then click **Continue**.

The screenshot shows the 'Add Datafile' dialog box. At the top right are 'Cancel' and 'Continue' buttons. The 'Storage Type' dropdown is set to 'Automatic Storage Management'. The 'DiskGroup' dropdown is set to 'DATA'. The 'Template' dropdown is set to '<Default>'. Below these are fields for 'Alias Directory' and 'Alias Name'. Under the 'Tablespace' section, the name is 'INVENTORY'. The 'File Size' field contains '5' with a 'MB' unit dropdown. A checkbox for 'Reuse Existing File' is unchecked. The 'Storage' tab is visible below, showing options for 'Automatically extend datafile when full (AUTOEXTEND)', 'Increment' (set to '0 KB'), and 'Maximum File Size' (set to 'Unlimited').

- f) Click the **Storage** tab, and verify that Extent Allocation is **Automatic**, Segment Space Management is **Automatic**, Compression Options is **Disabled**, and Logging is set to **Yes**.

## Practice 7-2: Creating a Tablespace (continued)

- g) Click the General tab and review your settings.

Create Tablespace

Show SQL Cancel OK

**Information**  
Modification to the datafile will not take effect until you click "OK" button.

**General** Storage

\* Name INVENTORY

**Extent Management**  
 Locally Managed  
 Dictionary Managed

**Type**  
 Permanent  
 Set as default permanent tablespace  
 Encryption [Encryption Options](#)

**Status**  
 Read Write  
 Read Only  
 Offline

**Datafiles**  
 Use bigfile tablespace  
Tablespace can have only one datafile with no practical size limit.

Add

Select Name	Directory	Size (MB)
<input checked="" type="radio"/> <ASM Generated>	+DATA/	5.00

- h) Click Show SQL to see the SQL that will be run, and then click Return
- i) Click OK, and a successful Update Message appears.
- 2) As the DBA1 user, run the `lab_07_02_02.sql` script to create and populate a table (called X) in the INVENTORY tablespace. What error do you eventually see?
- a) In a terminal window, navigate to the labs directory. Remember to use oraenv to set your environment for the orcl database if you have not done so already.

```
$ cd labs
```

- b) Log in to SQL\*Plus as the dba1 user (with a password of oracle\_4U) and run the `lab_07_02_02.sql` script.

**Note:** Remember to use oraenv to set your environment to the orcl database, if you have not already done so in your terminal window.

```
$ sqlplus dba1
```

```
SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 8 12:06:50  
2009
```

## Practice 7-2: Creating a Tablespace (continued)

```
Copyright (c) 1982, 2009, Oracle. All rights reserved.
```

```
Enter password:
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -  
Production  
With the Partitioning, Automatic Storage Management, OLAP,  
Data Mining  
and Real Application Testing options
```

```
SQL> @lab_07_02_02.sql
```

- c) Note that there is eventually an error ORA-01653 stating that the table cannot be extended. There is not enough space to accommodate all the rows to be inserted.

```
...  
SQL> insert into x select * from x  
  2 /  
  
1024 rows created.  
  
SQL> insert into x select * from x  
  2 /  
insert into x select * from x  
*  
ERROR at line 1:  
ORA-01653: unable to extend table DBA1.X by 128 in tablespace  
INVENTORY
```

```
SQL> commit  
  2 /  
  
Commit complete.  
  
SQL> quit  
Disconnected from Oracle Database 11g Enterprise Edition  
Release 11.1.0.6.0 - Production  
With the Partitioning, OLAP, Data Mining and Real Application  
Testing options
```

- 3) Go to the Enterprise Manager window and increase the amount of space available for the **INVENTORY** tablespace. For educational purposes, you will accomplish this using two different methods. First, increase the size of the current datafile to **40 MB**. Then, to show that both ASM and non-ASM datafiles can exist for the same tablespace, add a second datafile using file system storage. This second datafile should be **30 MB** in size. For both techniques use the show SQL functionality to view the supporting SQL statements.
- Select **Server> Storage > Tablespaces**.
  - Select the **INVENTORY** tablespace, and then click **Edit**.

## Practice 7-2: Creating a Tablespace (continued)

- c) In the Datafiles region, click **Edit**.
- d) Change File Size from 5 MB to **40 MB**.
- e) Click **Continue** to return to the General tabbed page.
- f) Click **Show SQL** to see the SQL that will be run. Note that it is an **ALTER DATABASE** statement. Click **Return**.

**Show SQL**

**ALTER DATABASE DATAFILE '+DATA/orcl/datafile/inventory.268.693647553' RESIZE 40M**

**Return**

- g) In the Datafiles region, click **Add**.
- h) Select **File System** for the Storage Type. Enter **inventory02.dbf** for the File Name. Enter **/u01/app/oracle/oradata/orcl** for the File Directory. Enter **30 MB** for the File Size.  
**Note:** This directory was created by the script you ran earlier.
- i) Click **Continue** to return to the General tabbed page.
- j) Click **Show SQL** to see the SQL that will be run. Note that it is an **ALTER DATABASE** statement. Click **Return**.

**Show SQL**

**ALTER TABLESPACE "INVENTORY" ADD DATAFILE '/u01/app/oracle/oradata/orcl/inventory02.dbf' SIZE 30M**

**Return**

- k) Click **Apply**.
- l) Notice now that there are now two datafiles for the INVENTORY tablespace, one that is using ASM storage and the other using file system (non-ASM) storage.

Datafiles				
		Directory	Size (MB)	Used (MB)
<input checked="" type="radio"/>	inventory02.dbf	/u01/app/oracle/oradata/orcl/	30.00	-34.00
<input type="radio"/>	inventory.268.693647553	+DATA/orcl/datafile/	40.00	-24.00

- 4) Go back to the terminal window and run the **lab\_07\_02\_04.sql** script. It drops the table and re-executes the original script that previously returned the space error.
  - a) Go to the terminal window.
  - b) Log in to SQL\*Plus as the **dba1** user (with a password of **oracle\_4U**) and run the **lab\_07\_02\_04.sql** script.  
**Note:** Remember to use oraenv to set your environment to the orcl database if you have not already done so in your terminal window.

```
$ sqlplus dba1

SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 8 12:06:50
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.
```

## **Practice 7-2: Creating a Tablespace (continued)**

```
Enter password:
```

```
Connected to:  
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -  
Production  
With the Partitioning, Automatic Storage Management, OLAP,  
Data Mining  
and Real Application Testing options
```

```
SQL> @lab_07_02_04.sql
```

- c) Note that the same number of row inserts are attempted, and there is no error because of the increased size of the tablespace.
- 5) In a terminal window, run the **lab\_07\_02\_05.sql** script in SQL\*Plus as the **dba1** user to clean up the tablespace for later practice sessions.  
**Note:** Remember to use oraenv to set your environment to the orcl database, if you have not already done so in your terminal window.

```
$ sqlplus dba1
```

```
SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 8 12:06:50  
2009
```

```
Copyright (c) 1982, 2009, Oracle. All rights reserved.
```

```
Enter password:
```

```
Connected to:  
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -  
Production  
With the Partitioning, Automatic Storage Management, OLAP,  
Data Mining  
and Real Application Testing options
```

```
SQL> @lab_07_02_05.sql
```

## **Practices for Lesson 8**

**Background:** You need to create a user account for Jenny Goodman, the new human resources department manager. There are also two new clerks in the human resources department, David Hamby and Rachel Pandya. All three must be able to log in to the `orcl` database and to select data from, and update records in, the `HR.EMPLOYEES` table. The manager also needs to be able to insert and delete new employee records. Ensure that if the new users forget to log out at the end of the day, they are automatically logged out after 15 minutes. You also need to create a new user account for the inventory application that you are installing.

## **Practice 8-1: Creating and Using a Profile**

In this practice, you create the INVENTORY user to own the new Inventory application. You create a profile to limit the idle time of users. If a user is idle or forgets to log out after 15 minutes, the user session is ended.

- 1) **Mandatory task:** Review and run the `lab_08_01_01.sh` script (located in the `/home/oracle/labs` directory) to create the **INVENTORY** user (with a password of `oracle_4U`), which you will use in the next practice.

- a) In a terminal window enter:

```
$ cd $HOME/labs
$ cat lab_08_01_01.sh
# Oracle Database 11g: Administration Workshop I
# Oracle Server Technologies - Curriculum Development
#
# ***Training purposes only***
#***Not appropriate for production use***
#
# Start this script as OS user: oracle
#   This script creates the INVENTORY schema user
#   The DROP command fails the first time
#   you execute the script.
#   The error can be ignored.

cd ~/labs

. set_db.sh

sqlplus / as sysdba << EOF
drop user inventory cascade;

create user inventory identified by oracle_4U
default tablespace inventory;

grant connect, resource to inventory;

exit;
EOF
$ ./lab_08_01_01.sh

SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 8 13:00:36
2009

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Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
```

## **Practice 8-1: Creating and Using a Profile (continued)**

```
and Real Application Testing options

SQL> SQL> drop user inventory cascade
      *
ERROR at line 1:
ORA-01918: user 'INVENTORY' does not exist

SQL> SQL>    2
User created.

SQL> SQL>
Grant succeeded.

SQL> SQL> Disconnected from Oracle Database 11g Enterprise
Edition Release 11.2.0.1.0 - Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options
$
```

- 2) Create a profile named **HRPROFILE** that allows only 15 minutes idle time.
  - a) Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
  - b) Click the **Server** tab, and then click **Profiles** in the Security section.
  - c) Click the **Create** button.
  - d) Enter **HRPROFILE** in the Name field.
  - e) Enter **15** in the Idle Time (Minutes) field.
  - f) Leave all the other fields set to **DEFAULT**.
  - g) Click the **Password** tab, and review the Password options, which are currently all set to **DEFAULT**.
  - h) Optionally, click the **Show SQL** button, review your underlying SQL statement, and then click **Return**.
  - i) Finally, click **OK** to create your profile
- 3) Set the **RESOURCE\_LIMIT** initialization parameter to **TRUE** so that your profile limits are enforced.
  - a) Click the **Server** tab, and then click **Initialization Parameters** in the Database Configuration section.
  - b) Enter **resource\_limit** in the Name field, and then click **Go**.
  - c) Select **TRUE** from the Value drop-down list, and then click **Apply**.

## **Practice 8-2: Creating Roles**

In this practice, you create the **HRCLERK** and **HRMANAGER** roles that will be used in the next practice.

- 1) Create the role named **HRCLERK** with **SELECT** and **UPDATE** permissions on the **HR.EMPLOYEES** table.
  - a) Click the **Server** tab and then click **Roles** in the Security section.
  - b) Click the **Create** button.
  - c) Enter **HRCLERK** in the Name field. This role is not authenticated.
  - d) Click **Object Privileges** tab.
  - e) Select **Table** from the Select Object Type drop-down list, and then click **Add**.
  - f) Enter **HR.EMPLOYEES** in the Select Table Objects field.
  - g) Move the **SELECT** and **UPDATE** privileges to the Selected Privileges box. Click **OK**.
  - h) Click the **Show SQL** button, and review your underlying SQL statement.

**Show SQL** Return

```
CREATE ROLE "HRCLERK" NOT IDENTIFIED
GRANT SELECT ON "HR"."EMPLOYEES" TO "HRCLERK"
GRANT UPDATE ON "HR"."EMPLOYEES" TO "HRCLERK"
```

- i) Click **Return**, and then click **OK** to create the role.
- 2) Create the role named **HRMANAGER** with **INSERT** and **DELETE** permissions on the **HR.EMPLOYEES** table. Grant the **HRCLERK** role to the **HRMANAGER** role.
  - a) Click the **Server** tab, and then click **Roles** in the Security section.
  - b) Click **Create**.
  - c) Enter **HRMANAGER** in the Name field. This role is not authenticated.
  - d) Click **Object Privileges** tab.
  - e) Select **Table** from the Select Object Type drop-down list, and then click **Add**.
  - f) Enter **HR.EMPLOYEES** in the Select Table Objects field.
  - g) Move the **INSERT** and **DELETE** privileges to the Selected Privileges box. Click **OK**.
  - h) Click the **Roles** tab, and then click **Edit List**.
  - i) Move the **HRCLERK** role into the Selected Roles box, and then click **OK**.

## **Practice 8-2: Creating Roles (continued)**

- j) Click the **Show SQL** button, and review your underlying SQL statement.

**Show SQL**

**Return**

```
CREATE ROLE "HRMANAGER" NOT IDENTIFIED
GRANT DELETE ON "HR"."EMPLOYEES" TO "HRMANAGER"
GRANT INSERT ON "HR"."EMPLOYEES" TO "HRMANAGER"
GRANT "HRCLERK" TO "HRMANAGER"
```

- k) Click **Return**, and then click **OK** to create the role.

## Practice 8-3: Creating and Configuring Users

In this practice, you create the following users and assign appropriate profiles and roles to these users:

Name	Username	Description
David Hamby	DHAMBY	A new HR Clerk
Rachel Pandya	RPANDYA	A new HR Clerk
Jenny Goodman	JGOODMAN	A new HR Manager

- 1) Create an account for David Hamby, a new HR clerk.
  - a) Click the **Server** tab, and then click **Users** in the Security section.
  - b) Click **Create**, and enter **DHAMBY** in the Name field.
  - c) Select **HRPROFILE** for the Profile.
  - d) Select Password Authentication, and enter **newuser** as password. Enter it into the **Confirm Password** field also. Select the **Expire Password now** check box so that David will have to change the password the first time he logs in.
  - e) Click the **Roles** tab. Notice that the CONNECT role has automatically been assigned to the user.
  - f) Add the **HRCLERK** role by clicking Edit List and moving the **HRCLERK** role into the Selected Roles box. Click **OK** to close the Modify Roles window.
  - g) Click **OK** again to create the user.
- 2) Create an account for Rachel Pandya, another new HR clerk. Repeat the steps shown above in step 1 but with **RPANDYA** as the username.
- 3) Create an account for Jenny Goodman, the new HR manager. Repeat the steps under step 1 but use **JGOODMAN** as the username and select the **HRMANAGER** role instead of the **HRCLERK** role.
  - a) Click the **Show SQL** button and review your underlying SQL statement.

**Show SQL** Return

```
CREATE USER "JGOODMAN" PROFILE "HRPROFILE" IDENTIFIED BY *****
PASSWORD EXPIRE ACCOUNT UNLOCK
GRANT "CONNECT" TO "JGOODMAN"
GRANT "HRMANAGER" TO "JGOODMAN"
```

- b) Click **Return**, and then click **OK** to create the user.
- 4) Test the new users in SQL\*Plus. Connect to the **orcl** database as the **DHAMBY** user. Use **oracle\_4U** as the new password. Select the row with **EMPLOYEE\_ID=197** from the **HR.EMPLOYEES** table. Then attempt to delete it. (You should get the “insufficient privileges” error.)
  - a) In a terminal window, enter:

```
$ . oraenv
```

### Practice 8-3: Creating and Configuring Users (continued)

```
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus dhamby
```

Or, if you are already in SQL\*Plus, use the CONNECT command. If you reconnect as dhamby in SQL\*Plus, the login and change-of-password session looks like this:

```
SQL> CONNECT dhamby
Enter password: newuser    <<<Password does not appear on screen
ERROR:
ORA-28001: the password has expired

Changing password for dhamby
New password: oracle_4U    <<<Password does not appear on screen
Retype new password: oracle_4U    <<<Password does not appear on screen
Password changed

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP, Data
Mining
and Real Application Testing options
SQL>
```

- b) Select the salary for **EMPLOYEE\_ID=197** from the **HR.EMPLOYEES** table.

```
SQL> SELECT salary FROM hr.employees WHERE EMPLOYEE_ID=197;

      SALARY
      -----
          3000
```

- c) Now attempt to delete the same record from the **hr.employees** table.

```
SQL> DELETE FROM hr.employees WHERE EMPLOYEE_ID=197;
DELETE FROM hr.employees WHERE EMPLOYEE_ID=197
*
ERROR at line 1:
ORA-01031: insufficient privileges
```

- 5) Repeat the test as the **JGOODMAN** user. Use **oracle\_4U** as the new password. After deleting the row, issue a rollback, so that you still have the original 107 rows.

- a) Connect to the **orcl** database as the **JGOODMAN** user.

```
SQL> connect jgoodman
Enter password:
ERROR:
ORA-28001: the password has expired
<Change the password to oracle_4U as shown above>
```

### **Practice 8-3: Creating and Configuring Users (continued)**

- b) Select the row with EMPLOYEE\_ID=197 from the HR.EMPLOYEES table.

```
SQL> SELECT salary FROM hr.employees WHERE EMPLOYEE_ID=197;  
  
SALARY  
-----  
3000
```

- c) Now delete the same row from the HR.EMPLOYEES table.

```
SQL> DELETE FROM hr.employees WHERE EMPLOYEE_ID=197;  
  
1 row deleted.
```

- d) Roll back the delete operation (because this was just a test).

```
SQL> rollback;  
  
Rollback complete.
```

- e) Confirm that you still have 107 rows in this table.

```
SQL> SELECT COUNT(*) FROM hr.employees;  
  
COUNT (*)  
-----  
107  
  
SQL>
```

**Question 1:** Where was the row stored after deletion?

**Answer:** It was stored in the Undo tablespace.

**Question 2:** When you created the new users, you did not select a default or temporary tablespace. What determines the tablespaces that the new users will use?

**Answer:** The system-defined default permanent and temporary tablespaces

**Question 3:** You did not grant the CREATE SESSION system privilege to any of the new users, but they can all connect to the database. Why?

**Answer:** Because Enterprise Manager automatically assigns the CONNECT role to the new users, and CREATE SESSION is contained within that role

- 6) Use SQL\*Plus to connect to the **orcl** database as the **RPANDYA** user. Change the password to **oracle\_4U**. (You must change the password, because this is the first connection as RPANDYA.) Leave RPANDYA connected during the next lesson or at the end of the day. HRPFILE specifies that users whose sessions are inactive for more than 15 minutes will automatically be logged out. Verify that the user was automatically logged out by trying to select from the **HR.EMPLOYEES** table again.

### ***Practice 8-3: Creating and Configuring Users (continued)***

```
ERROR at line 1:  
ORA-02396: exceeded maximum idle time, please connect again
```

## **Practices for Lesson 9**

**Background:** The Help desk just received a call from Susan Mavris, an HR representative, complaining that the database is “frozen.” Upon questioning the user, you find that she was trying to update John Chen’s personnel record with his new phone number, but when she entered the new data, her session froze and she could not do anything else. SQL script files are provided for you in the /home/oracle/labs directory.

## **Practice 9-1: Resolving Lock Conflicts**

In this practice, you use two separate SQL\*Plus sessions to cause a lock conflict. Using Enterprise Manager, you detect the cause of the lock conflict and then resolve the conflict. For your convenience, the SQL code that will cause the lock conflict has been provided in scripts that you run during this practice.

- 1) Make an uncommitted update to the row in question by running the **lab\_09\_01\_01.sql** script. This script first creates the users (smavris and ngreenberg) that are involved in this practice and the hremployee role that will give these new users access to the hr.employee table. It then logs in to SQL\*Plus as the ngreenberg user and performs an update on the hr.employee table. The script does not perform a commit, leaving the update uncommitted in this session.
  - a) Ensure your environment is configured for the **orcl** database by running **oraenv**.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

- b) Enter the following to run the script. When the script completes executing, you will see a note stating that an uncommitted update has been made.

```
$ sqlplus dba1

SQL*Plus: Release 11.2.0.1.0 Production on Thu Jul 9
03:57:42 2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> @lab_09_01_01.sql
Creating users...
...
... Some output not shown here to conserve space ...

Connecting as ngreenberg ...
Connected.
SQL> show user
USER is "NGREENBERG"
```

## **Practice 9-1: Resolving Lock Conflicts (continued)**

```
SQL> update hr.employees set phone_number='650.555.1212'
where employee_id = 110 ;

1 row updated.

SQL> prompt User "ngreenberg" made an update and left it
uncommitted in this session.
User "ngreenberg" made an update and left it uncommitted in
this session.
SQL>
SQL>
SQL>
```

- c) Leave this session connected in the state that it is currently. **Do not** exit at this time.
- 2) Make an attempt to update the same row in a separate session by running, in a separate terminal window, the **lab\_09\_01\_02.sql** script. Make sure that you see the message “Update is being attempted now” before moving on. Do not worry if the session seems to “hang”—this is the condition that you are trying to create.
  - a) Open a terminal window to start another command shell, and enter the following to run the second script.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus dba1

SQL*Plus: Release 11.2.0.1.0 Production on Thu Jul  9
04:04:47 2009

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Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> @lab_09_01_02.sql
Sleeping for 20 seconds to ensure first process gets the
lock first.

PL/SQL procedure successfully completed.

Sleep is finished.
Connected.
```

## Practice 9-1: Resolving Lock Conflicts (continued)

USER is "SMAVRIS"  
Update is being attempted now.

- b) Notice that this session appears to be hung. Leave this session as is and move on to the next step.
- 3) Using Enterprise Manager, click the **Blocking Sessions** link on the Performance page and detect which session is causing the locking conflict.
- a) In Enterprise Manager, click the **Performance** page.
  - b) Click **Blocking Sessions** in the **Additional Monitoring Links** area. You should see the following:

Blocking Sessions												
Page Refreshed Jul 9, 2009 4:13:46 AM GMT+07:00 Refresh												
<input type="button" value="View Session"/> <input type="button" value="Kill Session"/>												
Expand All   Collapse All												
Select	Username	Sessions Blocked	Session ID	Serial Number	SQL ID	Wait Class	Wait Event	P1 Value	P2 Value	P3 Value	Seconds in Wait	
<input type="radio"/>	▼ Blocking Sessions											
<input checked="" type="radio"/>	▼ NGREENBERG	1	51	7460		Idle	SQL*Net message from client	16508152321	0		862	
<input type="radio"/>	SMAVRIS	0	52	4319 6smgtv6h8958b	Application	eng: TX - row lock contention		1415053318 327697778			383	

- 4) What was the last SQL statement that the blocking session executed?
- a) Select the **NGREENBERG** session, and then click **View Session**.
  - b) Click the hash value link for **Previous SQL**.

Session Details: 51 (NGREENBERG)												
Collected From Target Jul 9, 2009 4:21:57 AM GMT+07:00												
<input type="button" value="View Data"/> Real Time: 15 Second Refresh <input type="button" value="Refresh"/>												
<input type="button" value="Kill Session"/> <input type="button" value="Enable SQL Trace"/>												
General					Activity	Statistics	Open Cursors	Blocking Tree	Wait Event History	Parallel SQL	SQL Monitoring	
Server			Client				Application					
Current Status <b>INACTIVE</b>			OS User Name <b>oracle</b>				Current SQL <b>None</b>					
Serial Number <b>7460</b>			OS Process ID <b>6962</b>				Current SQL Command <b>UNKNOWN</b>					
DB User Name <b>NGREENBERG</b>			Host <b>edrsr12p1.us.oracle.com</b>				Previous SQL <b>6smgtv6h8958b</b>					
OS Process ID <b>7129</b>			Terminal <b>pts/2</b>				Last Call Duration <b>22:34 (mm:ss)</b>					
Login Time <b>Jul 9, 2009 3:59:24 AM</b>			Current Client ID <b>Unavailable</b>				SQL Trace <b>DISABLED</b>					
Login Duration <b>22:34 (mm:ss)</b>			Current Client Info <b>Unavailable</b>				Current SQL Trace Level <b>1</b>					
Connection Type <b>DEDICATED</b>							Trace With Wait Information <b>DISABLED</b>					
Type <b>USER</b>							Trace With Bind Information <b>DISABLED</b>					
Resource Consumer Group <b>Unavailable</b>							Open Cursors <b>35</b>					
							Program <b>sqlplus@edrsr12p1.us.oracle.com (TNS V1-V3)</b>					
							Service <b>SYS\$USERS</b>					
							Current Module <b>SQL*Plus</b>					
							Current Action <b>Unavailable</b>					

- c) Note the SQL that was most recently run.

SQL Details: 6smgtv6h8958b												
<input type="button" value="Switch to SQL ID"/> <input type="button" value="Go"/> View Data Real Time: Manual Refresh <input type="button" value="Refresh"/> <input type="button" value="SQL Worksheet"/> <input type="button" value="Schedule SQL Tuning Advisor"/> <input type="button" value="SQL Repair Advisor"/>												
<input type="button" value="Text"/> <input type="button" value="Graphic"/>												
<pre>update hr.employees set phone_number='650.555.1212' where employee_id = 110</pre>												

- 5) Resolve the conflict in favor of the user who complained, by killing the *blocking* session. What SQL statement resolves the conflict?

## **Practice 9-1: Resolving Lock Conflicts (continued)**

- a) Click the browser's **Back** button.
- b) Now, on the Session Details: NGREENBERG page, click **Kill Session**.
- c) Leave the Options set to **Kill Immediate**, and then click **Show SQL** to see the statement that is going to be executed to kill the session.

**Note:** Your session and serial number are most likely to be different from those shown here.

**Show DDL**

**Return**

```
ALTER SYSTEM KILL SESSION '51,7460' IMMEDIATE
```

- d) Click **Return**, and then click **Yes** to carry out the **KILL SESSION** command.
- 6) Return to the SQL\*Plus command window, and note that SMAVRIS's update has now completed successfully. It may take a few seconds for the success message to appear.

```
USER is "SMAVRIS"
Update is being attempted now.

1 row updated.

Update is completed.
SQL>
```

- 7) Try issuing a SQL select statement in the NGREENBERG session. What do you see?

```
SQL> SELECT sysdate from dual;
SELECT sysdate from dual
*
ERROR at line 1:
ORA-03135: connection lost contact
Process ID: 7129
Session ID: 51 Serial number: 7460

SQL>
```

**Answer:** The session has been disconnected.

Close all open SQL sessions by entering **exit**, and then close the terminal windows.

## **Practices for Lesson 10**

**Background:** The business users and management in your organization decide, that they need to have a 48-hour retention of undo in the Oracle database to support their flashback needs. Your task is to configure the `orcl` database to support this requirement.

## **Practice 10-1: Managing Undo Data**

In this practice, you first view your system activity regarding undo, and then you configure the `orcl` database to support 48-hour retention for flashback operations.

- 1) In Enterprise Manager, as the **DBA1** user, view the undo related system activity.
  - a) Click the **Server** tabbed page and select **Automatic Undo Management** in the Database Configuration section.
  - b) Click the **System Activity** tabbed page.

**Automatic Undo Management**

In the General tab, you can view the current undo settings for your instance and use the Undo Advisor to analyze the undo tablespace requirements. This analysis can be performed based on the specified analysis period or the desired undo retention. The system activity for the specified time period can be viewed in the System Activity tab.

[General](#) [System Activity](#)

**System Activity During Analysis Period**

	Selected Analysis Time Period
Longest Running Query (minutes)	18.0
Average Undo Generation Rate (KB/minute)	75.0
Maximum Undo Generation Rate (KB/minute)	1,385.0
Queries failed due to low Retention	0
Transactions failed due to small Undo Tablespace	0

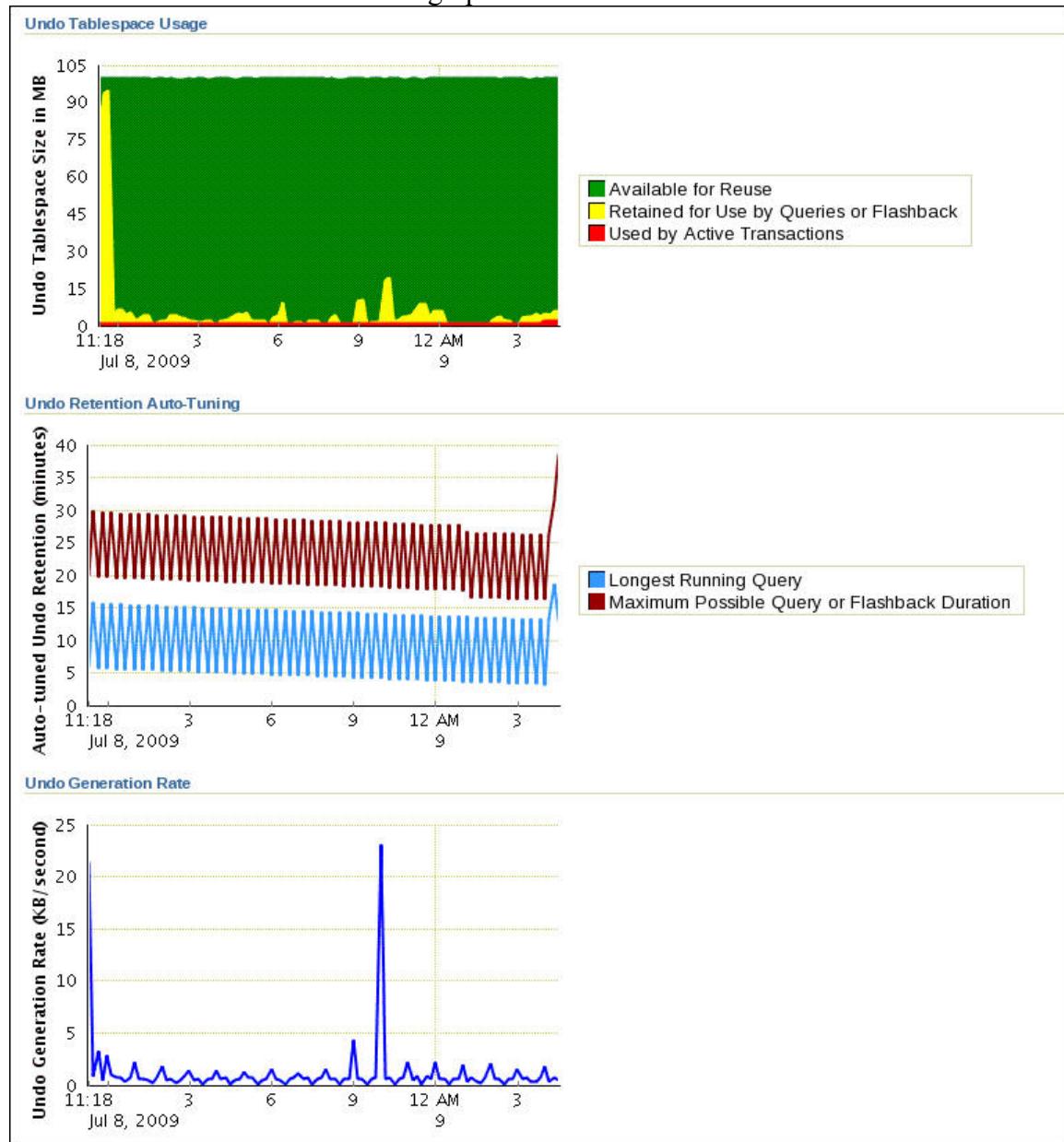
[Show Graph](#)

**Note:** Your information will look different on all analysis screenshots, based on your analysis period and the system activity during this period.

- c) *Question:* Looking at the preceding screenshot, how many errors did this system encounter?  
*Answer:* None
- d) *Question:* Looking at the preceding screenshot, what is the duration of the longest running query?  
*Answer:* 18 minutes (Your answer may be different.)

## Practice 10-1: Managing Undo Data (continued)

- e) Click the Plus icon to show related graphs.



- f) *Question:* How many graphs are displayed?

*Answer:* Three. (Undo Tablespace Usage, Undo Retention Auto-Tuning, and Undo Generation Rate)

- g) *Question:* Looking at the preceding Undo Retention Auto-Tuning graph, could this system support flashback above and beyond the current longest running query?

*Answer:* Yes, (but most likely not enough to support the required 48 hours).

- 2) Modify the undo retention time and calculate the undo tablespace size to support the requested 48-hour retention.

## **Practice 10-1: Managing Undo Data (continued)**

- a) Click the **General** tab to go back to the General Automatic Undo Management page.
- b) Under the Undo Advisor section, select “**Specified manually to allow for longer duration queries or flashback.**”
- c) Enter **48 hours** as Duration and click the **Run Analysis** button.

<b>Undo Retention Settings</b> Undo Retention (minutes) <b>15</b> Retention Guarantee <b>No</b>	<b>Undo Tablespace for this Instance</b> Tablespace <b>UNDOTBS1</b> <a href="#">Change Tablespace</a> Size (MB) <b>100</b> Auto-Extensible <b>Yes</b>
<b>Undo Advisor: Undo Retention and Undo Tablespace Sizing Advice</b> Undo retention is the length of time that undo data is retained in the undo tablespaces. Undo data must be retained for the length of the longest running query, the longest running transaction, and the longest flashback duration (except for Flashback Database). The undo tablespace should be sized large enough to hold the undo generated by the database during the undo retention period. Note that the undo retention parameter is also used as the retention value for LOB columns.	
<b>Analysis Period</b> Analysis Time Period <b>Last Seven Days</b> Desired Undo Retention <input type="radio"/> Automatically chosen based on longest query in analysis period <input checked="" type="radio"/> Specified manually to allow for longer duration queries or flashback Duration <b>48</b> hours <b>Run Analysis</b>	
<b>Analysis Results</b> <a href="#">Edit Undo Tablespace</a> <a href="#">Edit Undo Retention</a>	

## Practice 10-1: Managing Undo Data (continued)

- d) When the Undo Advisor is finished, examine the results.

**Automatic Undo Management**

In the General tab, you can view the current undo settings for your instance and use the Undo Advisor to analyze the undo tablespace requirements. This analysis can be performed based on the specified analysis period or the desired undo retention. The system activity for the specified time period can be viewed in the System Activity tab.

**General**    **System Activity**

**Undo Retention Settings**

Undo Retention (minutes)	15
Retention Guarantee	No

**Undo Tablespace for this Instance**

Tablespace	UNDOTBS1
Size (MB)	100
Auto-Extensible	Yes

**Undo Advisor: Undo Retention and Undo Tablespace Sizing Advice**

Undo retention is the length of time that undo data is retained in the undo tablespaces. Undo data must be retained for the length of the longest running query, the longest running transaction, and the longest flashback duration (except for Flashback Database). The undo tablespace should be sized large enough to hold the undo generated by the database during the undo retention period. Note that the undo retention parameter is also used as the retention value for LOB columns.

**Analysis Period**

Analysis Time Period: Last Seven Days

Desired Undo Retention:

Automatically chosen based on longest query in analysis period  
 Specified manually to allow for longer duration queries or flashback

Duration: 48 hours

**Analysis Results**

Selected Analysis Time Period: Jul 2, 2009 8:00:00 AM GMT+07:00 To Jul 9, 2009 8:00:00 AM GMT+07:00

Minimum Required Undo Tablespace Size (MB): 249

Recommended Undo Tablespace Size (MB): 20

**TIP** Recommended size is three times the minimum size to allow for workload fluctuations

Potential Problems: No Problem Found  
Recommendations: No Recommendation

**Show Graph**

**Note:** Your recommended size might be different from what is shown here.

- e) Click the **Show SQL** button in the upper-right corner of the General Automatic Undo Management page.

**Show SQL**

```
ALTER SYSTEM SET UNDO_RETENTION = 172800
```

**Return**

- f) This command will change the undo retention to support the 48-hour requirement. Review the SQL statement and click **Return**.
- g) Click **Apply** to make the change to undo retention.
- h) Now adjust the undo tablespace size by clicking the **Edit Undo Tablespace** button.
- i) Scroll down to Datafiles and click **Edit** to make a change to the datafile file size for the Undo tablespace.
- j) Change the file size to the Minimum Required Undo Tablespace Size that was determined when you ran the Undo Advisor (249 MB is the value in the screenshot above) and click **Continue**.

## Practice 10-1: Managing Undo Data (continued)

- k) Verify the SQL commands that will be executed by clicking Show SQL.

Show SQL

Return

```
ALTER DATABASE DATAFILE '+DATA/orcl/datafile/undotbs1.258.691672083' RESIZE 249M
ALTER DATABASE DATAFILE '+DATA/orcl/datafile/undotbs1.258.691672083' AUTOEXTEND ON NEXT 5M
```

Click **Return**.

- l) Click **Apply** to change the tablespace size.
- 3) Go back to the **Automatic Undo Management** page to see the results of the changes you just made. You see that the undo retention time has increased to support the 48 hours requirement. Your undo tablespace size has also increased based on the changes you made to the size of the datafile for the undo tablespace.

**Automatic Undo Management**

In the General tab, you can view the current undo settings for your instance and use the Undo Advisor to analyze the undo tablespace requirements. This analysis can be performed based on the specified analysis period or the desired undo retention. The system activity for the specified time period can be viewed in the System Activity tab.

**General** **System Activity**

<b>Undo Retention Settings</b> Undo Retention (minutes) <b>2880</b> Retention Guarantee <b>No</b>	<b>Undo Tablespace for this Instance</b> Tablespace <b>UNDOTBS1</b> <b>Change Tablespace</b> Size (MB) <b>249</b> Auto-Extensible <b>Yes</b>
---	---

- a) *Question:* Which Flashback operations are potentially affected by this change?  
*Answer:* Flashback query, Flashback transaction, and Flashback table.
- b) *Question:* Do undo data survive the shutdown of a database?  
*Answer:* Yes, undo is persistent.

## **Practices for Lesson 11**

**Background:** You have just been informed of suspicious activities in the HR.JOBS table in your orcl database. The highest salaries seem to fluctuate in a strange way. You decide to enable standard database auditing and monitor data manipulation language (DML) activities in this table.

## **Practice 11-1: Configuring Database Auditing**

Log in as the DBA1 user (with oracle\_4U password, connect as SYSDBA) and perform the necessary tasks either through Enterprise Manager Database Control or through SQL\*Plus. All scripts for this practice are in the /home/oracle/labs directory.

- 1) Use Enterprise Manager to enable database auditing. Set the **AUDIT\_TRAIL** parameter to **XML**.
  - a) Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
  - b) Click the **Server** tab, and then click **Audit Settings** in the Security section.
  - c) Click the value of Audit Trail, the **DB** link.
  - d) On the Initialization Parameters page, click the **SPFILE** tab.
  - e) Enter **audit** in the Name field and then click **Go**.
  - f) For the **audit\_trail** parameter, enter **XML** as the value.
  - g) Click **Show SQL**.

```
Show SQL
ALTER SYSTEM SET audit_trail = "XML" SCOPE=SPFILE
Return
```

- h) Review the statement and then click **Return**.
  - i) On the Initialization Parameters page, click **Apply**.
- 2) Because you changed a static parameter, you must restart the database. Do so by running the **lab\_11\_01\_02.sh** script.
  - a) In a terminal window, enter:

```
$ cd /home/oracle/labs
$ ./lab_11_01_02.sh
```
  - b) Continue with the next step when you see that the database is restarted.
- 3) Back in Enterprise Manager, select **HR.JOB\$** as the audited object and **DELETE**, **INSERT**, and **UPDATE** as Selected Statements. Gather audit information by session. Because the database has been restarted, you have to log in to Enterprise Manager again as the **DBA1** user.
  - a) Click **logout** in the upper-right corner of the Enterprise Manager window.
  - b) Log in as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
  - c) Click the Database home page tab to ensure that Enterprise Manager had time to update the status of the database and its agent connections.
  - d) Click the **Server** tab, and then click **Audit Settings** in the Security section.
  - e) Click the **Audited Objects** tab at the bottom of the page, and then click the **Add** button.

## **Practice 11-1: Configuring Database Auditing (continued)**

- f) On the Add Audited Object page, ensure that the Object Type is **Table**, and enter **HR.JOBS** in the Table field (or use the flashlight icon to retrieve this table).
- g) Move **DELETE**, **INSERT**, and **UPDATE** into the Selected Statements area by double-clicking each of them.
- h) Click **Show SQL**.



```
AUDIT DELETE, INSERT, UPDATE ON HR.JOBS BY SESSION
```

- i) Review the statement, and then click **Return**.
- j) Click **OK** to activate this audit.
- 4) Provide input for the audit, by executing the **lab\_11\_01\_04.sh** script. This script creates the AUDIT\_USER user, connects to SQL\*Plus as this user, and multiplies the values in the MAX\_SALARY column by 10. Then the HR user connects and divides the column values by 10. Finally, the AUDIT\_USER user is dropped again.
  - a) In a terminal window, enter:

```
$ cd /home/oracle/labs  
$ ./lab_11_01_04.sh
```

- 5) In Enterprise Manager, review the audited objects.
  - a) Click the **Server** tab, and then click **Audit Settings** in the Security section.
  - b) Click **Audited Objects** in the Audit Trails area, which is on the right side of the page.
  - c) On the Audited Objects page, review the collected information.



Schema	Object Name	User Name	Action	Time (In Session's Time Zone)
HR	JOBS	HR	SESSION REC	2009-07-09 08:57:01.812159
HR	JOBS	AUDIT_USER	SESSION REC	2009-07-09 08:57:01.71946

*Question:* Can you tell which user increased and which user decreased the salaries?

- Answer:* No, the standard audit records only show which user accessed the table.
- d) Click **Return**.
  - 6) Undo your audit settings for HR.JOBS, disable database auditing, and then restart the database by using the **lab\_11\_01\_06.sh** script.
    - a) On the Audit Settings page, click the **Audited Objects** tab at the bottom of the page.
    - b) Enter **HR** as Schema, and then click **Search**.
    - c) Select all three rows, and then click **Remove**.

## **Practice 11-1: Configuring Database Auditing (continued)**

- d) On the Confirmation page, click **Show SQL**.

The screenshot shows a confirmation dialog box with the following content:

**Confirmation**

Are you sure you want to remove the 3 selected audited objects?

The audited statements you remove will no longer be audited on the objects.

**Hide SQL**

NOAUDIT DELETE ON HR.JOBS  
NOAUDIT INSERT ON HR.JOBS  
NOAUDIT UPDATE ON HR.JOBS

**No** **Yes**

- e) Review the statements, and then click **Yes** to confirm your removal.
- f) On the Audit Settings page, click **XML** in the Configuration region.
- g) On the Initialization Parameters page, click the **SPFile** tab.
- h) On the SPFile page, enter **audit** in the Name field, and then click **Go**.
- i) For the **audit\_trail** parameter, enter **DB** as the value.
- j) Click **Show SQL**.

The screenshot shows a page with the following content:

**Show SQL**

ALTER SYSTEM SET audit\_trail = "DB" SCOPE=SPFILE

**Return**

- k) Review the statement, and then click **Return**.
- l) On the Initialization Parameters page, click **Apply**.
- m) Because you changed a static parameter, you must restart the database. Do so by running the **lab\_11\_01\_06.sh** script. In a terminal window, enter:

```
$ cd /home/oracle/labs  
$ ./lab_11_01_06.sh
```

- 7) Maintain your audit trail: Because you are completely finished with this task, backup and delete all audit files from the **/u01/app/oracle/admin/orcl/adump** directory.

- a) In a terminal window, enter:

```
$ cd /u01/app/oracle/admin/orcl/adump  
$ ls
```

- b) Create a backup of the audit trail files, and then remove the files

```
$ tar -czf $HOME/audit_today.tar.z *  
$ rm -f *
```

- c) Close the terminal window.

## **Practices for Lesson 12**

**Background:** You want to proactively monitor your `orcl` database so that common problems can be fixed before they affect users. This practice session invents some issues so that you can familiarize yourself with the tools that are available. First, execute scripts to set up your database environment for this exercise.

## **Practice 12-1: Database Maintenance**

- 1) Create a new, locally managed tablespace called TBSSPC. It has a data file of 50 MB in the +DATA disk group. Ensure that the TBSSPC tablespace does not use Automatic Segment Space Management (ASSM). Execute the **lab\_12\_01\_01.sh** script to perform these tasks. In a terminal window, enter:

```
$ cd /home/oracle/labs
$ cat lab_12_01_01.sh
...
sqlplus / as sysdba << END

set echo on

drop tablespace TBSSPC including contents and datafiles;

CREATE SMALLFILE TABLESPACE "TBSSPC"
DATAFILE '+DATA' SIZE 50M
AUTOEXTEND ON NEXT 10M MAXSIZE 200M
LOGGING
EXTENT MANAGEMENT LOCAL
SEGMENT SPACE MANAGEMENT MANUAL;

exit;
END

$ ./lab_12_01_01.sh
```

- 2) Create a new SPCT user, identified by oracle\_4U. Assign the TBSSPC tablespace as the default tablespace. Assign the TEMP tablespace as the temporary tablespace. Grant the following roles to the SPCT users: CONNECT, RESOURCE, and DBA. Execute the **lab\_12\_01\_02.sh** script to perform these tasks. In a terminal window, enter:

```
$ cat lab_12_01_02.sh
...
sqlplus / as sysdba << END

set echo on

drop user spct cascade;

create user spct identified by oracle_4U
default tablespace TBSSPC
temporary tablespace temp;

grant connect, resource, dba to spct;

exit;
END

$ ./lab_12_01_02.sh
```

## **Practice 12-1: Database Maintenance (continued)**

- 3) Use the DBMS\_ADVVISOR package to set the database activity time to 30 minutes. As the SPCT user, drop and create the SPCT table and gather statistics for this table. Create a snapshot in Automatic Workload Repository (AWR). Execute the **lab\_12\_01\_03.sh** script to perform these tasks. In a terminal window, enter:

```
$ cat lab_12_01_03.sh
...
sqlplus / as sysdba << EOF

set echo on

exec
dbms_advisor.set_default_task_parameter('ADDM', 'DB_ACTIVITY_MI
N', 30);

connect spct/oracle_4U

drop table spct purge;
create table spct(id number, name varchar2(2000));

exec DBMS_STATS.GATHER_TABLE_STATS(-
ownname=>'SPCT', tabname=>'SPCT', -
estimate_percent=>DBMS_STATS.AUTO_SAMPLE_SIZE);

exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();

exit;
EOF
$ ./lab_12_01_03.sh
```

- 4) Create the activity to be analyzed. Execute the **lab\_12\_01\_04.sh** script to perform these tasks.

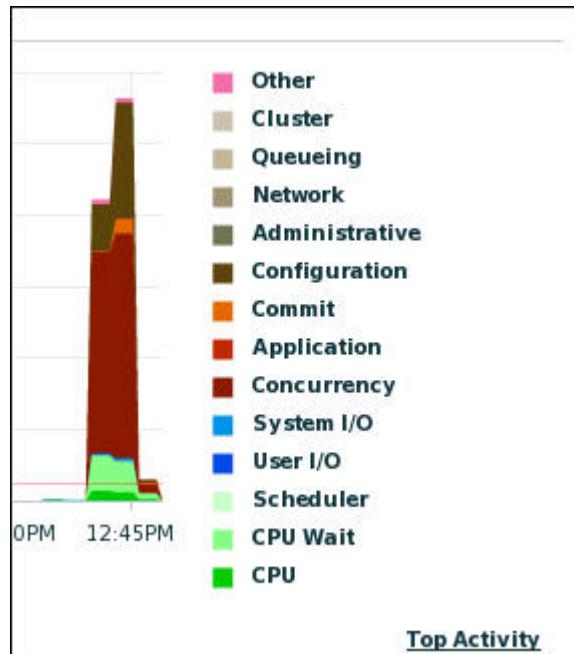
In a terminal window, enter the following. You may have to press [Enter] after you see that several PL/SQL procedures have completed, in order to see the command prompt again.

```
$ ./lab_12_01_04.sh
```

- 5) In Enterprise Manager, review the Performance page as a user connected as SYSDBA. View performance data in real time with a 15-seconds refresh cycle. After a while, you should see a spike on the Average Active Sessions graph. This is your activity to be analyzed. Looking at the graph, you can already determine that this instance is suffering from concurrency problems.
- Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.

## Practice 12-1: Database Maintenance (continued)

- b) Click the **Performance** tab.



**Note:** Depending on when you run the workload, you may see differences between your graph and the one provided as a possible solution.

- c) After the spike is finished, execute the **lab\_12\_01\_05.sh** script. This script forces the creation of a new snapshot and gathers statistics on your SPCT table.

**Note:** Causing the same performance problem in all environments is not easy. To help make your test more successful, wait an extra minute or so after the spike has completely finished before running the script.

After the spike has finished, in a terminal window, enter:

```
$ ./lab_12_01_05.sh
```

- 6) Look at the **Performance Analysis** findings in order of their impact. There are several access paths to this information. The results should look similar to the following:

ADDM Performance Analysis		
Task Name ADDM:1219452990_1_32		
Task Owner	SPCT	Average Active Sessions 8.1
		Period Start Time Jul 9, 2009 12:42:25 PM GMT+07:00
		Duration 5 (minutes)
Impact (%) ▾	Finding	Occurrences (24 hrs ending with analysis period)
95.9	Top SQL Statements	4 of 22
32.1	Buffer Busy - Hot Objects	1 of 22
21.6	Unusual "Concurrency" Wait Event	1 of 22
19.8	High Watermark Waits	1 of 22
10.5	Buffer Busy - Hot Block	1 of 22
4.2	Shared Pool Latches	1 of 22
2.4	Commits and Rollbacks	2 of 22
2	Buffer Cache Latches	1 of 22

## Practice 12-1: Database Maintenance (continued)

Looking at the Performance Analysis section, you see that the first finding has a high percentage (in this example, 95.9%) impact on the system. So your first impulse is to look at this finding in more detail. However, looking at this SQL statement does not yet help you to understand the concurrency problem of your database.

Investigate the other findings in order of severity. Look at the Buffer Busy findings in particular. For one of the Buffer Busy results, you should see that there is read-and-write contention on your SPCT table. The recommended action is to use the Automatic Segment Space Management (ASSM) feature for your SPCT table. The following steps guide you through this exercise.

- a) Navigate to the Database home page, and then click **Advisor Central** at the bottom of the page.
- b) Your ADDM task should already be displayed. If not, search for it and display it on this page.

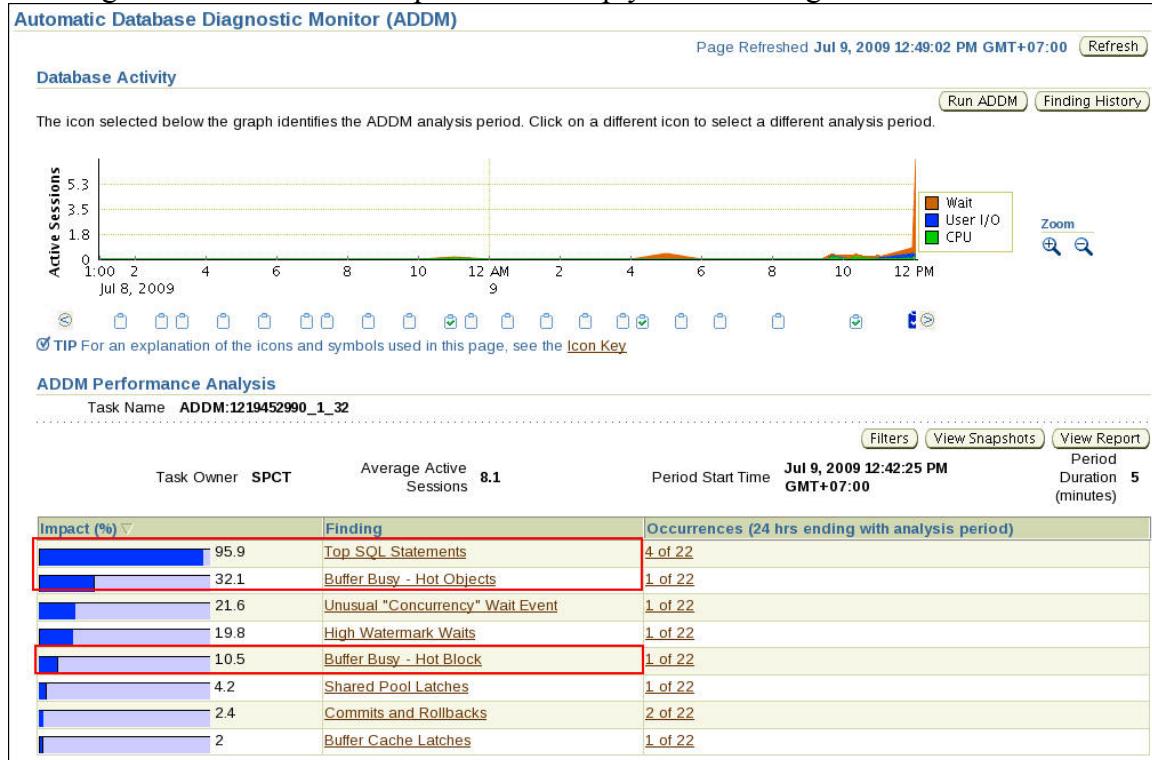
The screenshot shows the Oracle Advisor Central interface. At the top, there are tabs for 'Advisors' and 'Checkers'. On the right, there are buttons for 'View Data' and 'Real Time: 15 Second Refresh'. Below the tabs, there's a section titled 'Advisors' with links to ADDM, Memory Advisors, and SQL Advisors. To the right of these are links to Automatic Undo Management, MTTR Advisor, and SQL Performance Analyzer, each with a corresponding 'Data Recovery Advisor', 'Segment Advisor', and 'Streams Performance Advisor'. Underneath is a section titled 'Advisor Tasks' with a 'Search' field and filters for 'Advisory Type' (set to 'All Types'), 'Task Name' (empty), 'Advisor Runs' (set to 'Last 31 Days'), and 'Status' (set to 'All'). A note below the search says: 'By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.' The main area is titled 'Results' and contains a table with columns: Advisory Type, Name, Description, User, Status, Start Time, Duration (seconds), and Expires In (days). Two rows are shown: one for an ADDM task named 'ADDM\_1219452990\_1\_32' which completed successfully, and another for 'ADDM\_1219452990\_1\_28' which also completed successfully. The first row is highlighted with a red border.

Advisory Type	Name	Description	User	Status	Start Time	Duration (seconds)	Expires In (days)
ADDM	ADDM_1219452990_1_32	ADDM auto run: snapshots [31, 32], instance 1, database id 1219452990	SPCT	COMPLETED	Jul 9, 2009 12:47:28 PM	2	30
ADDM	ADDM_1219452990_1_28	ADDM auto run: snapshots [27, 28], instance 1, database id 1219452990	SYS	COMPLETED	Jul 9, 2009 11:01:58 AM	23	30

- c) Select the task, and then click the **View Result** button (alternatively, click the name of the task).

## Practice 12-1: Database Maintenance (continued)

- d) The ADDM page appears, showing the detailed results from the ADDM run.  
**Note:** Do not click the Run ADDM Now button because you already executed the ADDM performance analysis when you ran the `lab_12_01_05.sh` script. Clicking the button now would produce an empty set of findings.



Looking at the Performance Analysis section, you see that the first finding has a high impact on the system (in this example, 95.9%). You also notice that there are Buffer Busy findings as well. Because the Top SQL Statements finding is impacting your system by such a high percent, your first impulse is to look at this finding in more detail.

**Note:** Because there are several factors that can affect performance on your classroom machine, your results may not be exactly as shown. The findings may appear in a different order. If you do not see results similar to the ones outlined in the preceding screenshot, you may need to restart this practice. If you still do not see the expected results, you may need to adjust the load by modifying the `lab_12_01_04.sh` and `lab_12_01_04.sql` scripts. Ask your instructor for assistance if this is the case. Take care not to increase the load too much or you will slow your system down too much.

- e) Click the “Top SQL Statements” link in the Finding column.
- f) Review the recommendations on the Performance Finding Details page. However, looking at this SQL statement does not yet help you to understand the concurrency problem of your database. Click the **Back** icon in your Web browser.

## Practice 12-1: Database Maintenance (continued)

- g) Look at the Buffer Busy findings on the Automatic Database Diagnostic Monitor (ADDM) page. Click the first occurrence of the Buffer Busy finding, in this case, the Buffer Busy – Hot Objects link.

**Performance Finding Details: Buffer Busy - Hot Objects**

Finding Read and write contention on database blocks was consuming significant database time. ([Finding History](#))

Impact (Active Sessions) 2.59  
Percentage of Finding's Impact (%) 32.1  
Period Start Time Jul 9, 2009 12:42:25 PM GMT+07:00  
Period Duration (minutes) 5  
Filtered No ([Filters](#))

**Recommendations**

Show All Details | Hide All Details

Details	Category	Benefit (%)
▼ Hide Schema		32.1

Action Consider using ORACLE's recommended solution of automatic segment space management in a locally managed tablespace for the tablespace "TBSSPC" containing the TABLE "SPCT.SPCT" with object ID 74614. Alternatively, you can move this object to a different tablespace that is locally managed with automatic segment space management.  
Database Object [SPCT.SPCT](#)

Rationale There was significant read and write contention on TABLE "SPCT.SPCT" with object ID 74614.  
Database Object [SPCT.SPCT](#)

Show Schema	Benefit (%)
► Show Schema	32.1
► Show Schema	32.1

**Findings Path**

Expand All | Collapse All

Findings	Percentage of Finding's Impact (%)	Additional Information
▼ Read and write contention on database blocks was consuming significant database time.	32.1	
▼ Read and write contention on database blocks was consuming significant database time.	32.1	
Wait class "Concurrency" was consuming significant database time.	59.8	

The findings show that there is read-and-write contention on database blocks. The recommendation is to use a tablespace that is locally managed with Automatic Segment Space Management.

- h) Go back to the ADDM page and look at the other Buffer Busy findings. One of them should look similar to the following:

**Performance Finding Details: Buffer Busy - Hot Block**

Finding A hot data block with concurrent read and write activity was found. The block belongs to segment "SPCT.SPCT" and is block 631 in file 8. ([Finding History](#))

Impact (Active Sessions) .85  
Percentage of Finding's Impact (%) 10.5  
Period Start Time Jul 9, 2009 12:42:25 PM GMT+07:00  
Period Duration (minutes) 5  
Filtered No ([Filters](#))

**Recommendations**

Show All Details | Hide All Details

Details	Category	Benefit (%)
▼ Hide Application Analysis		10.5

Action Investigate application logic to find the cause of high concurrent read and write activity to the data present in this block.

Rationale The SQL statement with SQL\_ID "3csh3g3mjhzmz" spent significant time on "buffer busy" waits for the hot block.  
SQL Text [INSERT INTO SPCT VALUES \(NULL,'a'\)](#)  
SQL ID [3csh3g3mjhzmz](#)

Show Schema	Benefit (%)
► Show Schema	10.5

**Findings Path**

Expand All | Collapse All

Findings	Percentage of Finding's Impact (%)	Additional Information
▼ A hot data block with concurrent read and write activity was found. The block belongs to segment "SPCT.SPCT" and is block 631 in file 8.	10.5	
▼ Read and write contention on database blocks was consuming significant database time.	32.1	
Wait class "Concurrency" was consuming significant database time.	59.8	

This finding shows that there is a hot data block that belongs to the SPCT . SPCT table. The recommendation is to investigate the application logic to find the cause.

## **Practice 12-1: Database Maintenance (continued)**

- 7) You decide to implement the recommendation to use Automated Segment Space Management. To do this, you must re-create the object. Create a new, locally managed tablespace, called TBSSPC2 with a 50 MB data file in the +DATA disk group. Ensure that the TBSSPC2 tablespace uses the Automatic Segment Space Management feature. Then execute the **lab\_12\_01\_07.sh** script to drop the SPCT table, to re-create it in the new tablespace, to gather statistics, and to take a new snapshot.
- In Enterprise Manager, click the **Server** tab, and then **Tablespaces** in the Storage section.
  - Click **Create**.
  - Enter TBSSPC2 as the tablespace name, and verify that Extent Management is **Locally Managed**, Type is **Permanent**, Status is **Read Write**, and Use bigfile tablespace is *not selected*.
  - Click **Add** in the **Datafiles** region.
  - On the Add Datafile page, ensure that the DiskGroup is **DATA** and enter **50 MB** as File Size.
  - Click **Continue**.
  - Click the **Storage** tab, and verify that Extent Allocation is **Automatic**, Segment Space Management is **Automatic**, and Logging is **enabled**.
  - Click the **General** tab.
  - Click **Show SQL**, and view the SQL that will be run, and then click **Return**.

```
Show SQL  
CREATE SMALLFILE TABLESPACE "TBSSPC2" DATAFILE '+DATA' SIZE 50M LOGGING EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO
```

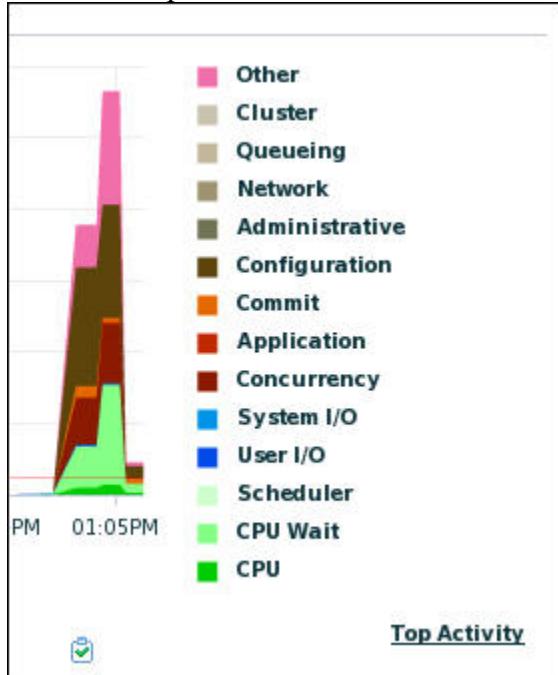
- Click **OK**. A successful Confirmation message appears.
- In a terminal window, enter:  

```
$ ./lab_12_01_07.sh
```
- Execute your workload again. (Use the **lab\_12\_01\_04.sh** script.)  
In a terminal window, enter the following. You may have to press [Enter] after you see that several PL/SQL procedures have completed, in order to see the command prompt again.  

```
$ ./lab_12_01_04.sh
```
- In Enterprise Manager, review the Performance page as a user connected as SYSDBA. View performance data in real time with a 15-seconds refresh cycle. After a while, you should see a spike on the Average Active Sessions graph.  
After the spike is finished, execute the **lab\_12\_01\_05.sh** script again. This script forces the creation of a new snapshot and gathers statistics on your ADDM table.

## **Practice 12-1: Database Maintenance (continued)**

- a) Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
- b) Click the **Performance** tabbed page. Watch for the spike in the Active Sessions chart to complete.



- c) After the spike is finished, run the **lab\_12\_01\_05.sh** script to force the creation of a new snapshot and gather statistics on your SPCT table. Enter the following in a terminal window:

```
$ ./lab_12_01_05.sh
```

- 10) Review the ADDM from the **Advisor Central** link.

- a) Navigate to the Database home page, and then click **Advisor Central** at the bottom of the page.
- b) Click the top-most ADDM task name.

## **Practice 12-1: Database Maintenance (continued)**

- c) You see that the Buffer Busy findings about the read-and-write contention is no longer there. By moving the ADDM table to the locally managed TBSSPC2 tablespace, which uses the Automatic Autoextend Segment feature, you obviously fixed the root cause of the contention problem.

**Note:** You may see additional Buffer Busy findings (at a lower impact percentage) and other further recommendations that could improve performance, but you are not going to pursue them at this time.



- 11) To not affect other practice sessions, execute the **lab\_12\_01\_11.sh** script to clean up your environment.

In a terminal window, enter:

```
$ ./lab_12_01_11.sh
```

## **Practices for Lesson 13**

**Background:** Users are complaining about slower-than-normal performance for operations involving the human resources and order-entry applications. When you question other members of the DBA staff, you find that maintenance was recently performed on some of the tables belonging to the HR schema. You need to troubleshoot and make changes as appropriate to resolve the performance problems. SQL script files are provided for you in the /home/oracle/labs directory. Other directories are individually named.

## **Practice 13-1: Managing Performance**

- 1) Log in to SQL\*Plus as the SYS user and perform maintenance on tables in the HR schema by running the **lab\_13\_01\_01.sql** script.

```
$ cd ~/labs
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus / as sysdba
SQL> @lab_13_01_01.sql
```

- 2) You get calls from HR application users saying that a particular query is taking longer than normal to execute. The query is in the **lab\_13\_01\_02.sql** script. To run this file, enter the following in SQL\*Plus:

```
SQL> CONNECT hr
Password: oracle_4U    <<<Password does not appear on screen
Connected.
SQL> @lab_13_01_02.sql
```

- 3) Using Enterprise Manager, locate the HR session in which the above statement was just executed, and view the execution plan for that statement.
  - a) In Enterprise Manager, click the **Performance** tab, and the click **Search Sessions** in the Additional Monitoring Links section.
  - b) On the Search Sessions page, change the Search criteria to “**DB User**,” enter **HR** in the field to the right of that, and then click **Go**.
  - c) Click the **SID** number in the Results listing.
  - d) You now see the Session Details page for this session. Click the **hash value link** to the right of the Previous SQL label in the Application section.

## Practice 13-1: Managing Performance (continued)

- e) On the SQL Details page, you see the details for the last SQL statement executed by that session, which is the one in question. Click the **Plan** tab to see the execution plan for the query.

SQL Details: bckcqw5pd108f

Switch to SQL ID  Go View Data Real Time: Manual Refresh Refresh SQL Worksheet Schedule SQL Tuning Advisor SQL Repair Advisor

Text

```
select *
from hr.employees
where employee_id = 200
```

Details

Select the plan hash value to see the details below. Plan Hash Value 1445457117

Statistics Activity **Plan** Plan Control Tuning History SQL Monitoring

Data Source Cursor Cache Capture Time Jul 9, 2009 10:44:01 AM (UTC+07:00) Parsing Schema HR Optimizer Mode ALL\_ROWS

Additional Information

Expand All | Collapse All

Operation	Object	Order	Rows	Bytes	Cost	CPU (%)	Time	Query Block Name/Object Alias	Filter	Projection
▼ SELECT STATEMENT		2			3	100				
	TABLE ACCESS FULL	EMPLOYEES	1	69	3	0	0:0:1	SEL\$1 / EMPLOYEES@SEL\$1	"EMPLOYEE_ID"=200	[NUMBER,22], "EMP..."

Show Explain Rewrite

- f) You see in the Operation column that this query is doing a full table scan (TABLE ACCESS FULL). Because you know that the query's condition is an equality comparison on the primary key (EMPLOYEE\_ID), you decide to investigate the status of the primary key index.
- 4) Using Enterprise Manager, check to see the status of the **EMPLOYEE** table's index on **EMPLOYEE\_ID**. See if it is **VALID**.
- From the Database Home page, click the **Schema** tab, and then **Indexes**.
  - Select **Table Name** as the Search By value.
  - Enter **HR** in the **Schema** field.
  - Enter **EMPLOYEES** for Object Name.
  - Click **Go**, and the list of six indexes appears.

## Practice 13-1: Managing Performance (continued)

- f) Click the index named **EMP\_EMP\_ID\_PK**.

The screenshot shows the Oracle Database search interface. In the search bar, 'Schema' is set to 'HR' and 'Object Name' is set to 'EMPLOYEES'. The search results table lists various indexes for the EMPLOYEES table, including:

Select	Table Owner	Table	Indexed Columns	Index Owner	Index	Table Type	Tablespace	Partitioned	Last Analyzed
<input checked="" type="checkbox"/>	HR	EMPLOYEES	EMAIL	HR	EMP_EMAIL_UK	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00
<input checked="" type="checkbox"/>	HR	EMPLOYEES	MANAGER_ID, LAST_NAME	HR	EMP_NAME_IX	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00
<input checked="" type="checkbox"/>	HR	EMPLOYEES	MANAGER_ID	HR	EMP_MANAGER_IX	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00
<input checked="" type="checkbox"/>	HR	EMPLOYEES	DEPARTMENT_ID	HR	EMP_DEPARTMENT_IX	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00
<input checked="" type="checkbox"/>	HR	EMPLOYEES	JOB_ID	HR	EMP_JOB_IX	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00
<input checked="" type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	HR	EMP_EMP_ID_PK	TABLE	EXAMPLE	NO	Aug 26, 2008 12:46:38 AM GMT+07:00

- g) On the View Index page, notice that the status of the index is UNUSABLE.

The screenshot shows the 'View Index' page for the index 'HR.EMP\_EMP\_ID\_PK'. The 'General' section displays the following information:

- Name: EMP\_EMP\_ID\_PK
- Schema: HR
- Tablespace: EXAMPLE
- Index Type: Normal
- Status: UNUSABLE

- 5) Now that you have seen one index with a non-VALID status, you decide to check all indexes. Using SQL\*Plus, as the **HR** user, find out which HR schema indexes do not have STATUS of VALID. To do this, you can query a data dictionary view with a condition on the STATUS column.

- a) Go to the SQL\*Plus session where you are still logged in as the HR user, and run this query:

```
SQL> select index_name, table_name, status
  from user_indexes where status <> 'VALID';
```

INDEX_NAME	TABLE_NAME	STATUS
EMP_EMAIL_UK	EMPLOYEES	UNUSABLE
EMP_EMP_ID_PK	EMPLOYEES	UNUSABLE
EMP_DEPARTMENT_IX	EMPLOYEES	UNUSABLE

## Practice 13-1: Managing Performance (continued)

EMP_JOB_IX	EMPLOYEES	UNUSABLE
EMP_MANAGER_IX	EMPLOYEES	UNUSABLE
EMP_NAME_IX	EMPLOYEES	UNUSABLE

6 rows selected.

SQL>

- b) You notice that the output lists six indexes, all on the **EMPLOYEES** table. This is a problem you will need to fix.
- 6) You decide to use Enterprise Manager to reorganize all the indexes in the HR schema that are marked as UNUSABLE.
  - a) In Enterprise Manager, on the page displaying the **EMP\_EMP\_ID\_PK** index, select **Reorganize** in the Actions list, and then click **Go**.
  - b) On the Reorganize Objects pages, click **Add**, to add each of the other five indexes to the reorganization operation.
  - c) In the Add screen, choose **Indexes** for the Type drop-down list, and enter **HR** in the Schema field. Click **Search**.
  - d) Select the five other indexes whose names start with “**EMP\_**.”

**Objects: Add**

Database Instance **orcl.oracle.com**      Logged In As **SYS**      **Cancel**      **OK**

**Search**

Type	Indexes	<input checked="" type="checkbox"/> Include minimum size filter in search query
Schema	HR	Minimum Size (KB)
Object Name		
Partition Name		
Tablespace		
<b>Search</b>		

**Available Objects: Indexes**

Select	Name	Type	Tablespace	Size (KB)	Partitioned	IOT
<input type="checkbox"/>	HR.DEPT_ID_PK	Index	EXAMPLE	64	NO	N/A
<input type="checkbox"/>	HR.DEPT_LOCATION_IX	Index	EXAMPLE	64	NO	N/A
<input checked="" type="checkbox"/>	HR.EMP_DEPARTMENT_IX	Index	EXAMPLE	64	NO	N/A
<input checked="" type="checkbox"/>	HR.EMP_EMAIL_UK	Index	EXAMPLE	64	NO	N/A
<input checked="" type="checkbox"/>	HR.EMP_JOB_IX	Index	EXAMPLE	64	NO	N/A
<input checked="" type="checkbox"/>	HR.EMP_MANAGER_IX	Index	EXAMPLE	64	NO	N/A
<input checked="" type="checkbox"/>	HR.EMP_NAME_IX	Index	EXAMPLE	64	NO	N/A
<input type="checkbox"/>	HR.JHIST_DEPARTMENT_IX	Index	EXAMPLE	64	NO	N/A
<input type="checkbox"/>	HR.JHIST_EMPLOYEE_IX	Index	EXAMPLE	64	NO	N/A
<input type="checkbox"/>	HR.JHIST_EMP_ID_ST_DATE_PK	Index	EXAMPLE	64	NO	N/A

- e) Click **OK** to go back to the Reorganize Objects: Objects page.
- f) Verify that all six indexes for the **EMPLOYEES** table are listed and click **Next**.
- g) Keep all the default settings for Options, and then click **Next**. The reorganize script generation occurs, and then the Impact Report appears.
- h) Note that there are no problems reported on Impact Report, and then click **Next**.

## Practice 13-1: Managing Performance (continued)

- i) On the Schedule page, enter **oracle** and **oracle** for Username and Password under Host Credentials.
- j) Click **Next**.
- k) On the Review page, click **Submit Job**.
- l) After the Confirmation page appears, click the **View job Details** to see the job status.

The confirmation page shows a message: "The reorganization job named REORGANIZE\_ORCL.ORACLE.COM\_1 has been submitted." A button labeled "View Job Details" is highlighted with a red box.

- m) Click **Reload** on your browser until you see the job has succeeded.

Job Run: REORGANIZE\_ORCL.ORACLE.COM\_1  
Page Refreshed Jul 9, 2009 10:53:29 AM GMT+07:00 [Delete Run] [Edit] [View Definition]

Summary	
Status	Succeeded
Scheduled	Jul 9, 2009 10:52:46 AM (UTC+07:00)
Started	Jul 9, 2009 10:52:46 AM (UTC+07:00)
Ended	Jul 9, 2009 10:52:57 AM (UTC+07:00)
Elapsed Time	11 seconds
Notification	No
Type	Reorganize
Owner	SYS
Description	
DB Username	SYS
Username	oracle
Script	/u01/app/oracle/product/11.2.0/d...

- 7) Return to the SQL\*Plus session where the HR user is logged in, and run the **lab\_13\_01\_07.sql** script to execute the same kind of query. Then repeat the steps to see the plan of the last SQL statement executed by this session, to see if the plan has changed.

- a) Enter the following at the SQL\*Plus prompt:

```
SQL> @lab_13_01_07.sql
```

- b) Repeat the tasks listed in step 3 to view the execution plan for the query. Now the icon indicates the use of an index. Click **View Table**. Note that the plan now uses an index unique scan.

Details  
Select the plan hash value to see the details below. Plan Hash Value 1833546154

Statistics	Activity	Plan	Plan Control	Tuning History	SQL Monitoring				
Data Source	CURSOR Cache	Capture Time Jul 9, 2009 10:55:37 AM (UTC+07:00)		Parsing Schema	HR Optimizer Mode ALL_ROWS				
Additional Information									
<a href="#">Expand All</a>   <a href="#">Collapse All</a>									
Operation	Object	Order	Rows	Bytes	Cost (%)	CPU Time	Query Block Name/Object Alias	Predicate	Projection
SELECT STATEMENT		3			1 100				
TABLE ACCESS BY INDEX ROWID	EMPLOYEES	2	1	69	1 0 0:0:1	SEL\$1 / EMPLOYEES@SEL\$1			"EMPLOYEE_ID"[NUMBER,22], "EMP...
INDEX UNIQUE SCAN	EMP_EMP_ID_PK1		1		0	SEL\$1 / EMPLOYEES@SEL\$1	"EMPLOYEE_ID"=201	"EMPLOYEES".ROWID[ROWID,10], "	"...

- c) Quit the SQL\*Plus session.
- 8) What is the difference in execution plans, and why?

**Answer:** The statement execution uses a unique index scan instead of a full table scan, because the index is usable after your index reorganization.

## Practice 13-1: Managing Performance (continued)

- 9) Simulate a working load on your instance by running the `lab_13_01_09.sql` script as the SYS user. Please note the SID value that is reported.

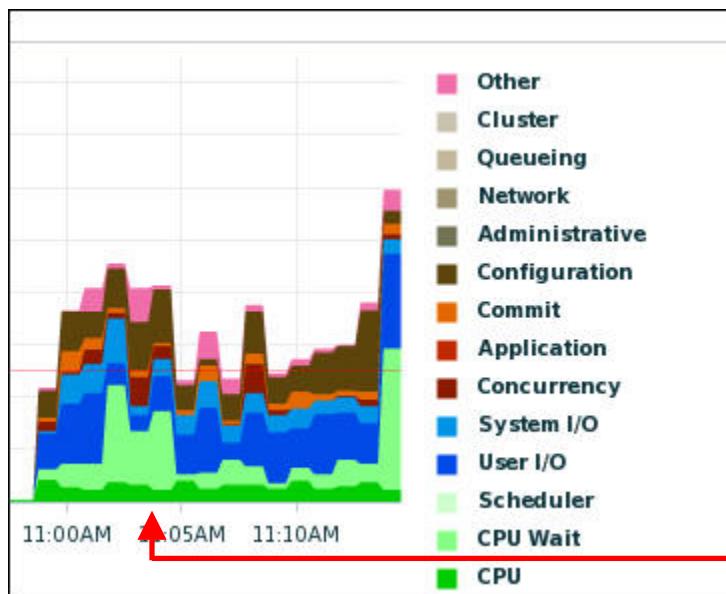
**SID value reported:** \_\_\_\_\_

This script takes about 20 minutes to complete. So, run it in a separate terminal window and continue with this practice exercise while it runs.

**Note:** Because this script generates a fairly heavy load in terms of CPU and disk I/O, you will notice that response time for Database Control is slower.

```
$ sqlplus / as sysdba  
SQL> @lab_13_01_09.sql
```

- 10) Go back to Enterprise Manager and examine the performance of your database.
- In Enterprise Manager, navigate to the Performance page, and investigate system performance.
  - You may need to wait a minute or two to see the effects of the load generation script appear on the graphs.



Wait to see some levels of activity in the **Average Active Sessions** graph before proceeding.

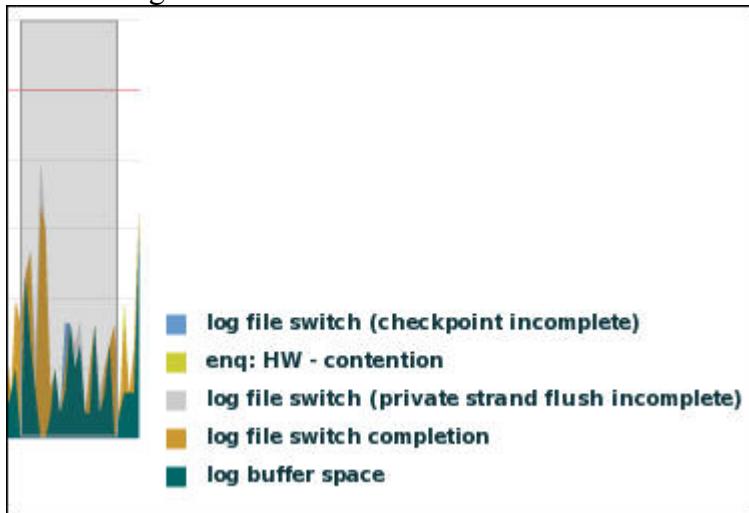
**Question 1:** In the Average Active Sessions graph, which are the two main categories that active sessions are waiting for?

**Answer:** In this example, it looks like CPU Wait and User I/O are quite high. Configuration is also showing high wait activity. Your results may differ from what is shown here.

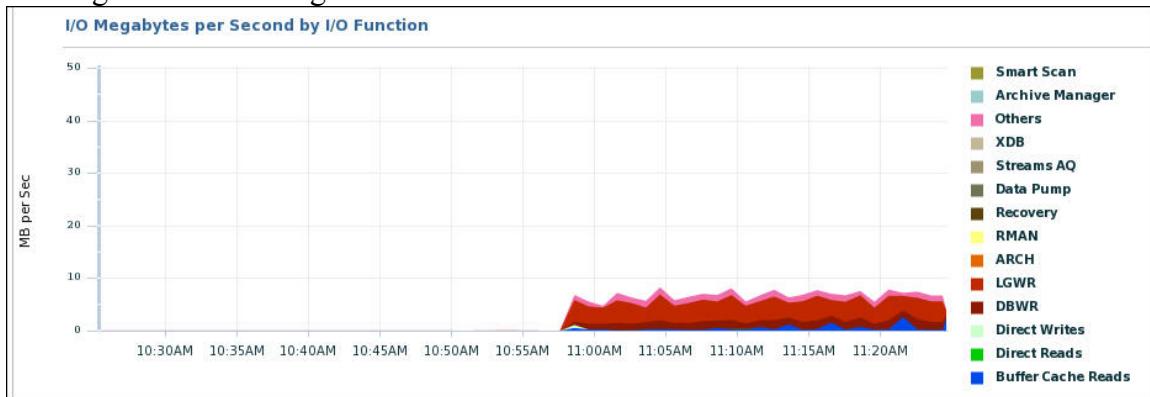
**Question 2:** In the Configuration category of waits, what is one of the contributors to the wait time? Click Configuration to see the graph.

## Practice 13-1: Managing Performance (continued)

**Answer:** Any one of these, but log file switch completion and log buffer space seem to be the highest contributors:



**Question 3:** Click Back, and then click Settings on the Performance page. For the Detail Chart Settings select I/O for Default View, and I/O Function for I/O Chart Settings, and then click **OK**. Scroll down to the IO charts to determine which process is doing the most writing to the disk.



**Answer:** LGWR

- c) Click **Top Activity** in the Additional Monitoring Links region.

## Practice 13-1: Managing Performance (continued)

- d) Click the SQL ID of the first SQL statement listed in the Top SQL region.

Detail for Selected 5 Minute Interval			
Start Time Jul 9, 2009 11:21:23 AM GMT+07:00			
Top SQL			
Actions	Schedule SQL Tuning Advisor	Go	
Select All	Select None		
Select	Activity (%)	SQL ID	SQL Type
<input type="checkbox"/>	46.54	<a href="#">0qqwcxx1quwuv</a>	DELETE
<input type="checkbox"/>	16.71	<a href="#">axn4pkvbt51a</a>	INSERT
<input type="checkbox"/>	4.06	<a href="#">348vt5h86jjj7</a>	INSERT
<input type="checkbox"/>	2.39	<a href="#">6amygb1ygg2y7</a>	INSERT
<input type="checkbox"/>	2.15	<a href="#">6gvch1xu9ca3g</a>	PL/SQL EXECUTE

- e) See the first SQL statement.

11) Kill the session that is generating the load. Use the session ID recorded in step 9. The session ID is listed in the **SID** column of the Detail for Selected 5 Minute Interval.

- a) Click the **SID** number for the session ID recorded earlier. This is found under the heading **Detail for Selected 5 Minute Interval**.

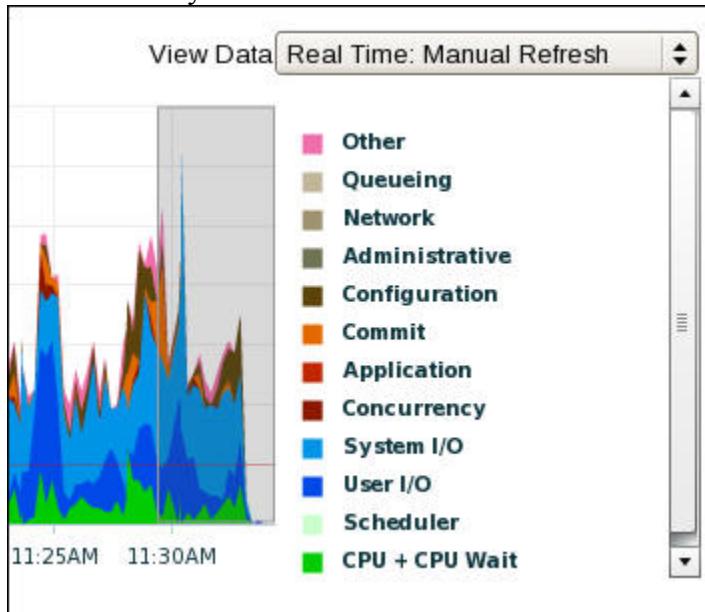
Detail for Selected 5 Minute Interval				Run AWR SQL Report		Run ASH Report	
Start Time Jul 9, 2009 11:21:23 AM							
Activity (%)	SID	QC SID	User Program	Service	Plan Hash Value		
100.00	86		SYS sqlplus@edrsr12p1.us.oracle.com (TNS V1-V3)	SYS\$USERS	2494303166		

- b) On the Session Details page, click **Kill Session**, and then click **Yes** to confirm.

**Note:** If you remain on this Session Details page long enough for a few automatic refreshes to be done, you may see a warning, “WARNING, Session has expired.” or a SQL Error saying the session is marked for kill. This warning means you are attempting to refresh information about a session that has already been killed. You can ignore this warning.

### **Practice 13-1: Managing Performance (continued)**

- c) Click **Top Activity** in the navigation history at the top of the page. Note that the session activity in the database has declined considerably.



## **Practices for Lesson 14**

**Background:** Your `orcl` database is ready to move from test or development into production.

Configure your database to reduce the chances of failure or data loss. To do so, perform the following tasks:

- Ensure redundancy of control files and backup the control file to trace
- Review the fast recovery area configuration
- Ensure that there are at least two redo log members in each group
- Place your database in ARCHIVELOG mode
- Configure redundant archive log destinations

## **Practice 14-1: Configuring Your Database for Recovery**

In this practice, you configure your database to reduce the chances of failure or data loss.

**Note:** Completing this practice is a prerequisite for all following backup and recovery practices.

- 1) First, run the **lab\_14\_01\_01.sh** script to create some more data that will be used in scenarios during the upcoming practices. This script creates tables in the INVENTORY tablespace and simulates some basic activity on your database.

```
$ cd ~/labs  
$ ./lab_14_01_01.sh
```

- 2) Verify that you have at least two control files to ensure redundancy.
  - a) Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
  - b) Click **Server > Control Files** (in the Storage section).

The screenshot shows the 'Control Files' page in Oracle Enterprise Manager. At the top, there are tabs for 'General', 'Advanced', and 'Record Section'. Below the tabs, a button labeled 'Backup To Trace' is visible. A section titled 'Control File Mirror Images' contains a note about Oracle's recommendation for having two control files on separate disks. Below this, a table lists two control files: one named 'current.260.692191347' located in '+DATA/orcl/controlfile/' and another with the same name located in '+FRA/orcl/controlfile/'. Both entries are marked as 'Valid'.

Valid	File Name	File Directory
VALID	current.260.692191347	+DATA/orcl/controlfile/
VALID	current.256.692191347	+FRA/orcl/controlfile/

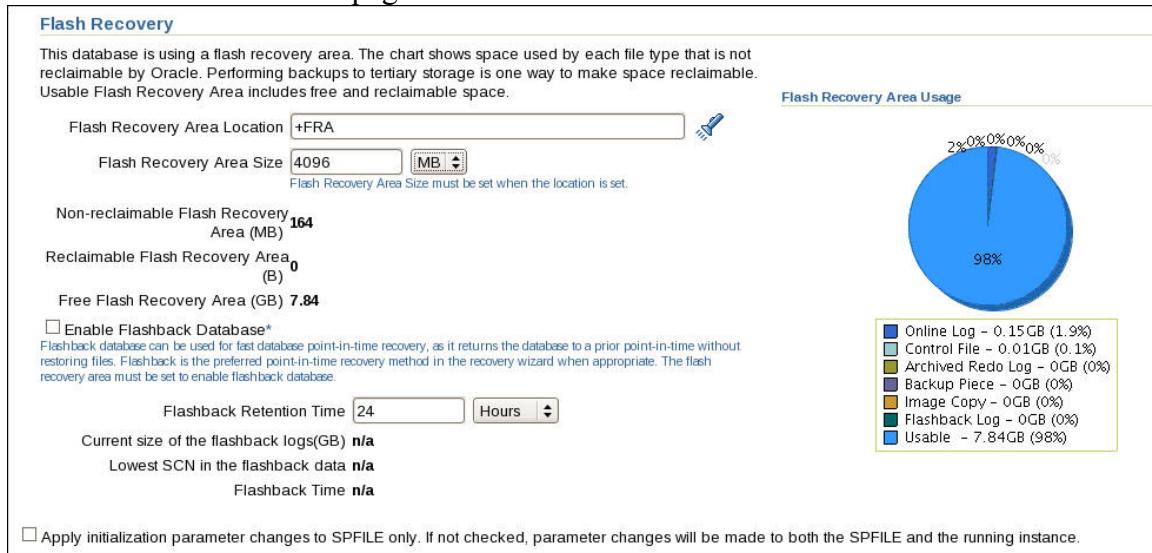
*Question 1:* On the Control Files: General page, how many control files do you have?

*Answer:* 2 .

- 3) Review the fast recovery area configuration and change the size to 8 GB.
  - a) In Enterprise Manager, select **Availability > Recovery Settings** in the Setup section.

## **Practice 14-1: Configuring Your Database for Recovery (continued)**

- b) Scroll to the bottom of the page.



- c) **Question:** Is the fast recovery area enabled?

**Answer:** Yes, because the FRA was configured during database creation using dbca.

- d) Note the location of the fast recovery area.

*For example:* +FRA

- e) **Question:** Which essential DBA tasks can you perform in this section?

**Answer:** You can change the location, size or retention time for the fast recovery area, as well as enable the Flashback Database functionality.

- f) **Question:** Does changing the size of the fast recovery area require the database to be restarted?

**Answer:** No, a restart is not required for this change.

- g) Change the size of the Fast Recovery Area to 8 GB, by entering **8** into the "Flash Recovery Area Size" field and choosing **GB** from the pick-list next to the size field.

- h) Optionally, click **Show SQL**, review the statement and click **Return**.

<b>Show SQL</b>	<b>Return</b>
<pre>ALTER SYSTEM SET db_recovery_file_dest_size = 8589934592 SCOPE=BOTH</pre>	

- i) Click **Apply**.

- 4) Check how many members each redo log group has. Ensure that there are at least two redo log members in each group. One set of members should be stored in the fast recovery area.

- a) Click **Server > Redo Log Groups**, and note how many members are in the "# of Members" column.

## Practice 14-1: Configuring Your Database for Recovery (continued)

**Answer:** There are two members in each group.

**Redo Log Groups**

Object Type Redo Log Group

**Search**  
Enter an object name to filter the data that is displayed in your results set.  
Object Name  Go  
By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.

Selection Mode Single

Select	Group	Status	# of Members	Archived	Size (KB)	Sequence	First Change#
<input checked="" type="radio"/>	1	Inactive	2	No	51200	127	3680499
<input type="radio"/>	2	Current	2	No	51200	128	3721156
<input type="radio"/>	3	Inactive	2	No	51200	126	3646837

- b) Select one of your Redo Log Groups and click View to see where each member of that group is stored. You should see one member in the +DATA disk group and the second member in the +FRA disk group.

**View Redo Log Group: 1**

Actions Clear logfile Go Edit Return

Group # 1  
File size 51200 KB  
Status INACTIVE

**Redo Log Members**

File Name	File Directory
group_1.261.691672257	+DATA/orcl/onlinelog/
group_1.257.691672265	+FRA/orcl/onlinelog/

- 5) You notice that, for each log group, the Archived column has a value of No. This means that your database is not retaining copies of redo logs to use for database recovery, and in the event of a failure, you will lose all data since your last backup. Place your database in ARCHIVELOG mode, so that redo logs are archived.

**Note:** You must continue with step 5, so that your changes are applied.

- In Enterprise Manager, select Availability > Recovery Settings in the Setup section.
- In the Media Recovery region, select the **ARCHIVELOG Mode** check box. Also, verify that Log Archive Filename Format contains %t, %s, and %r.

**Media Recovery**

The database is currently in NOARCHIVELOG mode. In ARCHIVELOG mode, hot backups and recovery to the latest time are possible, but you must provide space for archived redo log files. If you change the database to ARCHIVELOG mode, you should perform a backup immediately. In NOARCHIVELOG mode, only cold backups are possible and data may be lost in the event of database corruption.

ARCHIVELOG Mode\*

Log Archive Filename Format\*

Number	Archived Redo Log Destination	Status	Type
1	USE_DB_RECOVERY_FILE_DEST	VALID	Local

TIP It is recommended that archived redo log files be written to multiple locations spread across the different disks.  
 TIP You can specify up to 10 archived redo log destinations.

## **Practice 14-1: Configuring Your Database for Recovery (continued)**

- c) Notice the current configuration for the archive log destination is to USE\_DB\_RECOVERY\_FILE\_DEST, which points to the fast recovery area (+FRA).  
**Note:** If you add archive log destinations, you must create the directory, if it does not already exist.
  - d) Click **Apply**.
  - e) When prompted whether you want to restart the database now, click **Yes**.
  - f) Enter the host credentials to restart the database (oracle as the Username and Password) and then click **OK**.
  - g) When asked to confirm, click **Yes** again.
  - h) Should you receive an error during the shutdown and startup activity, click **OK** to acknowledge the error, and then click Refresh again. (You might have been simply faster than the database.)
- 6) Optionally, once your database has restarted, use SQL\*Plus to check whether your database is in ARCHIVELOG mode. In a terminal window, log in to SQL\*Plus as **SYSDBA** and run the **archive log list** command.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.1.0 Production on Sat Jul 11 10:16:40
2009

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Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> archive log list
Database log mode          Archive Mode
Automatic archival        Enabled
Archive destination        USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence 126
Next log sequence to archive 128
Current log sequence       128
SQL> exit
```

## **Practice 14-1: Configuring Your Database for Recovery (continued)**

```
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.1.0 - Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options
$
```

Now that your database is in ARCHIVELOG mode, it will continually archive a copy of each online redo log file before reusing it for additional redo data.

**Note:** Remember that this consumes space on the disk and that you must regularly back up older archive logs to some other storage.

## **Practices for Lesson 15**

**Background:** Now that your database is ready for production, it is time to start taking backups. Perform backup of the control file to trace, an immediate backup to disk, and schedule nightly backup jobs that repeat indefinitely.

## **Practice 15-1: Performing Database Backups**

In this practice, you backup your control file to trace, perform an immediate backup to disk, and schedule a nightly backup job.

- 1) Perform a backup of the control file to trace.
  - a) Invoke Enterprise Manager as the **DBA1** user in the **SYSDBA** role for your **orcl** database.
  - b) Click **Server > Control Files** (in the Storage section).

Valid	File Name	File Directory
VALID	current.260.692191347	+DATA/orcl/controlfile/
VALID	current.256.692191347	+FRA/orcl/controlfile/

- c) Click **Backup to Trace**.
- d) When you receive the success message, note the trace directory location, and then click **OK**.

Update Message  
Control file successfully backed up to trace at /u01/app/oracle/diag/rdbms/orcl/orcl/trace

- e) Optionally, use a terminal window, logged in as the **oracle** user to view the trace file name at the end of the alert log by executing the following command:

```
cd /u01/app/oracle/diag/rdbms/orcl/orcl/trace
tail alert_orcl.log
```

The following output shows only the last few lines:

```
$ cd /u01/app/oracle/diag/rdbms/orcl/orcl/trace
$ tail alert_orcl.log
Sat Jul 11 09:10:03 2009
SMCO started with pid=23, OS id=9837
Sat Jul 11 09:46:31 2009
ALTER DATABASE BACKUP CONTROLFILE TO TRACE
Backup controlfile written to trace file
/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_12190.trc
Completed: ALTER DATABASE BACKUP CONTROLFILE TO TRACE
Sat Jul 11 09:46:56 2009
ALTER DATABASE BACKUP CONTROLFILE TO TRACE
Backup controlfile written to trace file
/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_12190.trc
Completed: ALTER DATABASE BACKUP CONTROLFILE TO TRACE
$
```

- f) Optionally, to view size and usage of the different sections within the control file, click the Record Section tabbed page.

Type	Record Size	Records Total	Records Used
CKPT PROGRESS	8180	11	0
DATABASE	316	1	1
DATAFILE	520	100	7
FILENAME	524	2298	14
LOG HISTORY	56	292	5
REDO LOG	72	16	3
REDO THREAD	256	8	1
TABLESPACE	68	100	7

Your numbers could look different. For additional information, click Help in the upper-right corner of the page.

- 2) What is the difference between a backup set and an image copy?

**Answer:** A backup set contains data and archive log files packed in an Oracle proprietary format. Files must be extracted before use. Image copies are the equivalent of operating system file copies and can be used for restore operations immediately.

- 3) What is the destination of any disk backups that are done?

- a) Navigate to the **Availability** page and click **Backup Settings**.

**Disk Settings**

Parallelism  Concurrent streams to disk drives

Disk Backup Location  The flash recovery area is the current disk backup location. If you would like to override the disk backup location, specify an existing directory or diskgroup.

Disk Backup Type  **Backup Set** An Oracle backup file format that allows for more efficient backups by interleaving multiple backup files into one output file.

**Compressed Backup Set** An Oracle backup set in which the data is compressed to reduce its size.

**Image Copy** A bit-by-bit copy of database files that can be used as-is to perform recovery.

- b) Note the message under the Disk Backup Location that says the fast recovery area is the current disk backup location.
- 4) Establish the backup policy to automatically back up the SPFILE and control file.
- a) Click the **Policy** tab under the Backup Settings heading.

- b) Select “**Automatically backup the control file and server parameter file (SPFILE) with every backup and database structural change.**”

**Backup Settings**

**Device**   **Backup Set**   **Policy**

**Backup Policy**

Automatically backup the control file and server parameter file (SPFILE) with every backup and database structural change

Autobackup Disk Location

An existing directory or diskgroup name where the control file and server parameter file will be backed up. If you do not specify a location, the files will be backed up to the flash recovery area location.

Optimize the whole database backup by skipping unchanged files such as read-only and offline datafiles that have been backed up

Enable block change tracking for faster incremental backups

Block Change Tracking File

Specify a location and file, otherwise an Oracle managed file will be created in the database area.

- c) Scroll to the bottom and enter **oracle** and **oracle** for Host Credentials Username and Password for your server, and select “**Save as Preferred Credential.**”
- d) Click **OK**.
- 5) Test making a backup to disk, as a backup set, with **oracle** for Host Credentials.
- Click the **Device** tab under the Backup Settings pages.
  - Select **Backup Set** as your Disk Backup Type.
  - Scroll to the bottom and ensure the Host Credentials are set to **oracle**.
  - Scroll to the top of the page and click **Test Disk Backup**.
  - A processing message appears. When the test finishes, and you see the “Disk Backup Test Successful!” message, scroll down to the bottom of the page and click **OK**.
- 6) Back up your entire database, with archive logs, while the database is open for user activity. This backup should be the base for an incremental backup strategy.
- Question:** What prerequisite *must* be met to create a valid backup of a database without shutting it down?  
**Answer:** The database must be in ARCHIVELOG mode. Backups made with the database open, but not in ARCHIVELOG mode, cannot be used for recovery.
  - Select **Availability > Schedule Backup** (in the Manage section).  
If you find that the Oracle-Suggested Backup strategy fits your needs exactly, you would choose this option. For practice purposes, you will schedule a customized backup
  - Select **Whole Database** as the object to be backed up.
  - Confirm or enter **oracle** and **oracle** for Host Credentials Username and Password for your server.
  - Click **Schedule Customized Backup**.

- f) On the Schedule Customized Backup: Options page, select **Full Backup** for your Backup Type, and select the “**Use as the base of an incremental backup strategy**” check box.
- g) Select **Online Backup** as Backup Mode.
- h) In the Advanced section, select “**Also back up all archived logs on disk**” and “**Delete all archived logs from disk after they are successfully backed up**”, and then click **Next** to continue.
- i) On the Schedule Customized Backup: Settings page, select **Disk** for your backup location. (Notice that your Disk Backup Location is retained and that you could override the current settings for a one-off backup. But do not click it this time.)

**Schedule Customized Backup: Settings**

Database	orcl.oracle.com	<a href="#">Cancel</a>	<a href="#">Back</a>	<a href="#">Step 2 of 4</a>	<a href="#">Next</a>
Backup Strategy	Customized Backup				
Object Type	Whole Database				
Select the destination media for this backup. You can also override the default backup settings.					
<input checked="" type="radio"/> Disk <input type="radio"/> Tape Disk Backup Location +FRA <small>Media Management Vendor (MMV) Library Parameters Not specified</small>					
<a href="#">View Default Settings</a> <a href="#">Override Default Settings</a> <small>Changed settings will only apply to the current backup.</small>					

- j) Click **Next**.
- k) Accept all the defaults on the Schedule Customized Backup: Schedule page and then click **Next** to continue.  
**Note:** Schedule Type should be One Time (Immediately).
- l) On the Schedule Customized Backup: Review page, review the RMAN script, and then click **Submit Job**.

**Schedule Customized Backup: Review**

Database	orcl.oracle.com	<a href="#">Cancel</a>	<a href="#">Edit RMAN Script</a>	<a href="#">Back</a>	<a href="#">Step 4 of 4</a>	<a href="#">Submit Job</a>
Backup Strategy	Customized Backup					
Object Type	Whole Database					
<b>Settings</b>						
Destination: Disk Backup Type: Use as the base of an incremental backup strategy Backup Mode: Online Backup Flash Recovery Area: +FRA						
<b>RMAN Script</b>						
The RMAN script below is generated based on previous input. <pre>backup incremental level 0 cumulative device type disk tag '%TAG' database; backup device type disk tag '%TAG' archive log all not backed up delete all input;</pre>						

- m) Click **View Job** to monitor the status of the backup job. The time for this backup depends on your hardware and system resources.

- n) Click your browser's Refresh or Requery button until the job is completed.

The screenshot shows the 'Execution: orcl.oracle.com' page in Oracle Enterprise Manager. At the top, it says 'Page Refreshed Jul 11, 2009 10:35:15 AM GMT+07:00'. Below that is a 'Summary' section with various configuration details for the backup job. The 'Targets' section shows 'Targets: orcl.oracle.com' and 'Status: All'. The main table lists four steps: 'Step: Prebackup', 'Step: Backup', 'Step: Post Backup', and 'Step: Backups'. The 'Status' column for all steps is highlighted with a red box. The table also includes columns for 'Targets', 'Started', 'Ended', and 'Elapsed Time (seconds)'.

Name	Targets	Status	Started	Ended	Elapsed Time (seconds)
Execution: orcl.oracle.com	orcl.oracle.com	Succeeded	Jul 11, 2009 10:28:05 AM (UTC+07:00)	Jul 11, 2009 10:34:32 AM (UTC+07:00)	387
Step: Prebackup	orcl.oracle.com	Succeeded	Jul 11, 2009 10:28:25 AM (UTC+07:00)	Jul 11, 2009 10:28:26 AM (UTC+07:00)	1
Step: Backup	orcl.oracle.com	Succeeded	Jul 11, 2009 10:28:35 AM (UTC+07:00)	Jul 11, 2009 10:34:21 AM (UTC+07:00)	346
Step: Post Backup	orcl.oracle.com	Succeeded	Jul 11, 2009 10:34:30 AM (UTC+07:00)	Jul 11, 2009 10:34:32 AM (UTC+07:00)	2

- 7) Schedule nightly disk-based incremental online backups for your whole database, including archive logs. Have the archive logs deleted from disk after the backup is complete. Schedule it for execution at 11:00 PM. The schedule should be in effect indefinitely.
- In Enterprise Manager, select **Availability > Schedule Backup** (in the Manage section).
  - Select **Whole Database** as the object to be backed up.
  - Confirm or enter **oracle** and **oracle** for Host Credentials Username and Password for your server, and then click **Schedule Customized Backup**.
  - On the Schedule Customized Backup: Options page, select **Incremental Backup** as your Backup Type.
  - Select **Online Backup** as Backup Mode.
  - In the Advanced region, select "**Also backup all archived logs on disk**" and "**Delete all archived logs from disk after they are successfully backed up**", and then click **Next** to continue.
  - On the Schedule Customized Backup: Settings page, select **Disk** as your backup location, and then click **Next** to continue.
  - On the Schedule Customized Backup: Schedule page, change Job Name to **Nightly\_Backup** and accept the default value for Job Description.
  - Select **Repeating** in the Schedule region. Notice how additional context-sensitive details are displayed.

- j) Select **By Days** from the Frequency Type drop-down list, enter **1** in the Repeat Every field, confirm that Indefinite is selected as the Repeat Until value, and enter **11:00 PM** as Start Time.

**Schedule Customized Backup: Schedule**

Database	orcl.oracle.com	<a href="#">Cancel</a>	<a href="#">Back</a>	<a href="#">Step 3 of 4</a>	<a href="#">Next</a>
Backup Strategy	Customized Backup				
Object Type	Whole Database				
<b>Job</b>					
* Job Name <input type="text" value="Nightly_Backup"/> Job Description <input type="text" value="Whole Database Backup"/>					
<b>Schedule</b>					
Type	<input type="radio"/> One Time (Immediately)	<input type="radio"/> One Time (Later)	<input checked="" type="radio"/> Repeating		
Frequency Type	<input type="button" value="By Days"/>				
Repeat Every	<input type="text" value="1"/>	Days			
Time Zone	<input type="button" value="UTC-06:00 US Central Time (CST)"/>				
Start Date	<input type="text" value="Jul 11, 2009"/> <input type="button" value=""/>				
Start Time	<input type="text" value="11"/> : <input type="text" value="00"/>	<input type="radio"/> AM	<input checked="" type="radio"/> PM		
Repeat Until	<input checked="" type="radio"/> Indefinite <input type="radio"/> Specified Date Date <input type="text"/> <small>(example: Jul 11, 2009)</small> Time <input type="text"/> : <input type="text"/> <input type="radio"/> AM <input checked="" type="radio"/> PM				

- k) Click **Next** to continue.
- l) On the Schedule Customized Backup: Review page, review your Settings and RMAN script.

**Schedule Customized Backup: Review**

Database	orcl.oracle.com	<a href="#">Cancel</a>	<a href="#">Edit RMAN Script</a>	<a href="#">Back</a>	<a href="#">Step 4 of 4</a>	<a href="#">Submit Job</a>
Backup Strategy	Customized Backup					
Object Type	Whole Database					
<b>Settings</b>						
Destination	Disk					
Backup Type	Incremental Backup					
Backup Mode	Online Backup					
Flash Recovery Area	+FRA					
<b>RMAN Script</b>						
The RMAN script below is generated based on previous input.						
<pre>backup incremental level 1 cumulative device type disk tag '%TAG' database; backup device type disk tag '%TAG' archivelog all not backed up delete all input;</pre>						

- m) Click **Submit Job**, and then click **OK**.
- n) Click **Jobs** on the Availability page in the Related Links section to see the scheduled job in the Job Activity list.

**View** **Runs**

<a href="#">View Results</a>	<a href="#">Edit</a>	<a href="#">Create Like</a>	<a href="#">Copy To Library</a>	<a href="#">Suspend</a>	<a href="#">Resume</a>	<a href="#">Stop</a>	<a href="#">Delete</a>	<a href="#">Create Job</a>	<a href="#">OS Command</a>	<a href="#">Go</a>
Select	Name	Status (Executions)	Scheduled	Targets	Target Type	Owner	Job Type			
<input checked="" type="radio"/>	NIGHTLY_BACKUP	1 Scheduled	Jul 11, 2009 11:00:00 PM CDT	orcl.oracle.com	Database Instance	SYS	Database Backup			
<input type="radio"/>	BACKUP_ORCL.ORACLE.COM_000003	1 Succeeded	Jul 11, 2009 10:28:05 AM (UTC+07:00)	orcl.oracle.com	Database Instance	SYS	Database Backup			
<input type="radio"/>	REORGANIZE_ORCL.ORACLE.COM_1	1 Succeeded	Jul 9, 2009 10:52:46 AM (UTC+07:00)	orcl.oracle.com	Database Instance	SYS	Reorganize			

## **Practices for Lesson 16**

**Background:** Many failures of the Oracle database can be traced to some sort of media failure, such as disk or controller failure. In this practice, you encounter a number of problems from which you need to recover the database.

- Recover from the loss of a data file
- Recover from the loss of a file in the SYSTEM tablespace
- Recover from the loss of a control file

SQL script files are provided for you in the /home/oracle/labs directory. If needed, use the appendixes for Linux and for SQL syntax. *After you set up a failure with a SQL script, you must complete the recovery before continuing with any other practice.*

**Note:** Your system may have different OS file names than shown here. Your output might look different. (To conserve space, blank lines have been removed.)

## **Practice 16-1: Preparing Practice Environment**

Before beginning one of the recovery scenarios, you need to run a script that will prepare the environment for the remaining recovery practices.

- 1) Before setting up an individual problem, you must navigate to your **labs** directory and (in SQL\*Plus) execute the **lab\_16\_01\_01.sql** script as the **SYS** user. This script prepares some procedures to be called by the rest of this practice.

```
$ cd /home/oracle/labs
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.1.0 Production on Sun Jul 12 23:29:58
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> @lab_16_01_01.sql
Connected.

Java created.

Procedure created.

PL/SQL procedure successfully completed.

Synonym created.

Grant succeeded.

SQL>
```

## **Practice 16-2: Recovering from the Loss of a Data File**

In this practice, you experience the loss of an application data file. You then go through the steps to recover from this loss.

- 1) In a SQL\*Plus session, as the SYS user, execute the **lab\_16\_02\_01.sql** script from your **labs** directory. This script deletes one of your application data files.

**Note:** Remember to use **oraenv** to set your environment to the **orcl** database if you have not already done so in your terminal window.

```
$ sqlplus / as sysdba

SQL*Plus: Release 11.1.0.6.0 - Production on Sun Aug 31
10:45:19 2008

Copyright (c) 1982, 2007, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 -
Production
With the Partitioning, OLAP, Data Mining and Real Application
Testing options

SQL> @lab_16_02_01.sql

PL/SQL procedure successfully completed.

>Data file deleted. Database should be open."
SQL>
```

- 2) The Help desk has received a call from a user who is unable to access the **COUNTRIES** table in the **HR** application schema. Count the rows in the table to determine whether there is a problem.  
**Note:** If you do not see the data file error, try doing an update to the **INVENTORY.PRODUCT\_MASTER** table from another SQL\*Plus session. It may take a little while before the Oracle database realizes that the file is missing. If you do not want to wait you may skip this step and move on with the next step.

```
SQL> select count(*) from INVENTORY.PRODUCT_MASTER;
select count(*) from INVENTORY.PRODUCT_MASTER
*
ERROR at line 1:
ORA-00376: file 7 cannot be read at this time
ORA-01110: data file 7:
'/u01/app/oracle/oradata/orcl/inventory02.dbf'
SQL>
```

- 3) Troubleshoot and recover as necessary. The error message suggests that the **inventory02.dbf** data file is corrupt or missing.
  - a) In Enterprise Manager, on the Home page, look in the Alerts section and notice the Data Failure alert.

## Practice 16-2: Recovering from the Loss of a Data File (continued)

- b) Click Availability > Perform Recovery.
- c) Click Advise and Recover.
- d) On the View and Manage Failures page, click the plus (+) icon under the failure description. You should see a failure like the following:

**View and Manage Failures**

Select dropdown values and optionally enter failure description and impact strings to filter the data that is displayed.

Failure Description	Impact	Priority	Status	Time Detected
<input type="text"/>	<input type="text"/>	CRITICAL or HIGH	OPEN	All

Select failures and ...

Select Failure Description	Impact	Priority	Status	Time Detected
<input type="checkbox"/> Data Failures				
<input checked="" type="checkbox"/> One or more non-system datafiles are missing	See impact for individual child failures	HIGH	OPEN	2009-07-14 13:35:43.0
<input checked="" type="checkbox"/> Datafile 7: '/u01/app/oracle/oradata/orcl/inventory02.dbf' is missing	Some objects in tablespace INVENTORY might be unavailable	HIGH	OPEN	2009-07-14 13:35:43.0

Click here to collapse or expand the data failure details.

**Note:** If you do not see the nonsystem datafile failure, keep refreshing the page until it shows up.

- e) With the failures selected, click **Advise**.
- f) Because the file was not just renamed or moved, but deleted, you continue by clicking "**Continue with Advise**."

**Manual Actions**

The following user actions may provide a faster recovery path for certain simple failures. Click "Re-assess Failures" if user actions are performed. Otherwise, click "Continue with Advise" to use the recovery advice generated for the failures selected.

**Manual Action Details**

If file /u01/app/oracle/oradata/orcl/inventory02.dbf was unintentionally renamed or moved, restore it

- g) On the Recovery Advise page, you see the RMAN script. Click **Continue**.

**Recovery Advice**

The repair includes complete media recovery with no data loss

RMAN Script

```
# restore and recover datafile
sql 'alter database datafile 7 offline';
restore datafile 7;
recover datafile 7;
sql 'alter database datafile 7 online';
```

- h) On the Review page, you see the failure and the suggested solution. Click "**Submit Recovery Job**."
- i) A Processing window appears, followed by the Job Activity page. You should see a message that the job was successfully created. (Your link name is probably different.)

**Confirmation**

The job was created successfully

**RECOVERY\_ORCL.ORACLE.COM\_000005**

- j) Click the job name link.

## **Practice 16-2: Recovering from the Loss of a Data File (continued)**

- k) On the Job Run page, check the Status in the Summary section. If it is Running, use your browser's Refresh or Requery button until the job is completed.

### **Summary**

Status	<b>Succeeded</b>
Scheduled	<b>Jul 14, 2009 1:44:35 PM (UTC+07:00)</b>
Started	<b>Jul 14, 2009 1:44:35 PM (UTC+07:00)</b>
Ended	<b>Jul 14, 2009 1:45:18 PM (UTC+07:00)</b>
Elapsed Time	<b>42 seconds</b>
Notification	<b>No</b>

- l) In your SQL\*Plus session, verify that the INVENTORY.PRODUCT\_MASTER table is now accessible.

**Note:** Your count value may be different than the one shown here.

```
SQL> select count(*) from INVENTORY.PRODUCT_MASTER;
```

```
COUNT(*)  
-----  
217368
```

- m) Now that recovery is complete, in Enterprise Manager, navigate to the database Home page and clear the alert.
- Click the link in the Message column for the Data Failure alert.
  - Click **Clear Open Alert**.

## **Practice 16-3: Recovering from the Loss of a File in the SYSTEM Tablespace**

In this practice, your system experiences the loss of a file in the SYSTEM tablespace. You then go through the steps to recover from this loss.

- 1) Why is recovery from the loss of a system data file or a data file belonging to an undo tablespace different from recovering an application data file?

**Answer:** Because recovery of system or undo data files must be done with the database closed, whereas recovery of an application data file can be done with the database open and available to users

- 2) As the **oracle** OS user, execute the **lab\_16\_03\_02.sh** script in your **labs** directory. This script deletes the system data file.

```
$ ./lab_16_03_02.sh
```

- 3) In Enterprise Manager, review the Database home page. If you see a message that says the connection was refused, try re-entering the EM home page URL in the browser. You may need to try several times before you see the Database home page.

The screenshot shows the Oracle Enterprise Manager Database Instance page. At the top left, there is a red arrow pointing to the 'Status' field. The 'Status' field is set to 'Down'. To the right of the status, there is a 'Details' section containing the text 'There has been a user-initiated shutdown.'. Below the status and details, there are several configuration parameters: Host (edrsr10p1.us.oracle.com), Port (1521), SID (orcl), and Oracle Home (/u01/app/oracle/product/11.1.0/db\_1). At the top right of the page, there are two buttons: 'Startup' and 'Perform Recovery'.

- 4) The database is shut down. Attempt to start your database.
  - a) Click **Startup** to try to open it.
  - b) On the “Startup/Shutdown:Specify Host and Target Database Credentials” page, enter **oracle** and **oracle** as Host Credentials. Click **OK**.
  - c) On the Select Startup Type page, leave the default selection and click **OK**.
  - d) On the Startup/Shutdown:Confirmation page, click **Yes**.

## **Practice 16-3: Recovering from the Loss of a File in the SYSTEM Tablespace (continued)**

- e) A Srvctl Error appears saying that data file 1 cannot be identified. Click the Database tab to go back to your database Home page.

The screenshot shows the Oracle Enterprise Manager 11g Database Control interface. At the top, there's a banner with the title 'ORACLE Enterprise Manager 11g Database Control'. On the right side of the banner, there's a 'Database' tab which is highlighted with a red box. Below the banner, there's an error message box titled 'Srvctl Error' with a red 'X' icon. The message text is: 'An error occurred when executing the operation. Ensure that CRS processes and SRVCTL are functioning properly. Refresh the page to see the current status. Refer to the following error: startup open PRCR-1079 : Failed to start resource ora.orcl.db ORA-01157: cannot identify/lock data file 1 - see DBWR trace file ORA-01110: data file 1: '+DATA/orcl/datafile /system:256.692191147' CRS-2674: Start of 'ora.orcl.db' on 'edrsr12p1' failed'. Below the error message, there's a 'Startup/Shutdown: Select Operation' section. It has tabs for 'Startup' and 'Shutdown', with 'Startup' selected. There are buttons for 'Select All' and 'Select None'. A table lists an instance named 'orcl':

Select	Instance Name	Status	Host Name
<input checked="" type="checkbox"/>	orcl	↓	n/a

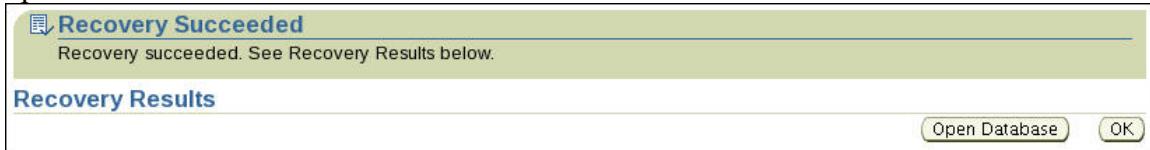
At the bottom right of the screen, it says 'Page Refreshed 7/14/09 1:58 PM' and there's a 'Refresh' button.

- 5) Click Perform Recovery.

- a) Enter **oracle** and **oracle** as Host Credentials, and click **Continue**.
- b) Your database is currently down, so it needs to be started in a mounted state to perform the recovery. Click the **Start up the Database** link.
  - i) You are prompted again for the host credentials, enter **oracle** and **oracle** and click **OK**.
  - ii) On the Select Startup Type page leave the default selection and click **OK**.
  - iii) Click **Advanced Options** on the Startup/Shutdown: Confirmation page.
  - iv) Select **Mount the database** for the Startup mode and click **OK**.
  - v) Click **Yes** back on the Startup/Shutdown: Confirmation page.
  - vi) Startup is Successful. Click the **Database** tab.
- c) Notice that your database is now in a mounted state. Click **Perform Recovery** again.
- d) In the Host Credentials section, enter **oracle** for the username and password. Then click **Continue**.
- e) On the Database Login page, enter **dba1** for the username, **oracle\_4U** for the password, and **SYSDBA** for Connect As. Then click **Login**.
- f) On the Perform Recovery page, click **Advise and Recover**.
- g) On the View and Manage Failures page, review the description of the failure. Ensure the System datafile failure is selected and then click **Advise**.
- h) On the Manual Actions page, click **Continue with Advise**.
- i) On the Recovery Advice page, review the RMAN script and click **Continue**.
- j) On the Review page, click **Execute Recovery**.

### **Practice 16-3: Recovering from the Loss of a File in the SYSTEM Tablespace (continued)**

- k) A processing page appears, followed by the Perform Recovery: Result page. The duration of this operation depends on your system resources. The recovery operation should be successful.



- l) On the Perform Recovery: Result page, click **Open Database**.
- m) After you see the success message, click **OK**.
- n) Verify that the database is open and operating normally, by logging in to EM as the **DBA1** user as **SYSDBA**, and reviewing the Database home page.
- o) Now that recovery is complete, clear the alert.
  - i) Click the link in the Message column for the Data Failure alert.
  - ii) Click **Clear Open Alert**.

## **Practice 16-4: Recovering from the Loss of a Control File**

In this practice, your system experiences the loss of a control file. To introduce the RMAN command-line environment, this practice guides you through a manual recovery process.

- 1) In a terminal window as the `oracle` user, run the `lab_16_04_01.sh` script. This script deletes one of your control files.

```
./lab_16_04_01.sh
```

- 2) The Help desk begins receiving calls saying that the database appears to be down. Troubleshoot and recover as necessary. Use SRVCTL to try to start up the database.
  - a) In a terminal window, ensure that your environment is configured for your `orcl` database environment using `oraenv`.
  - b) Issue the following SRVCTL command to attempt to start up the database:  
`srvctl start database -d orcl -o open`

```
$ srvctl start database -d orcl -o open
PRCR-1079 : Failed to start resource ora.orcl.db
ORA-00205: error in identifying control file, check alert log
for more info
CRS-2674: Start of 'ora.orcl.db' on 'edrsr12p1' failed
```

- 3) Further investigate this failure by looking at your `alert_orcl.log` file (located in `/u01/app/oracle/diag/rdbms/orcl/orcl/trace` directory): In a terminal window, enter the following to see the last 20 lines of your `alert_orcl.log` file.

```
$ tail -20 alert_orcl.log
ALTER DATABASE MOUNT
NOTE: Loaded library:
/opt/oracle/extapi/32/asm/orcl/1/libasm.so
NOTE: Loaded library: System
SUCCESS: diskgroup DATA was mounted
SUCCESS: diskgroup FRA was mounted
ORA-00210: cannot open the specified control file
ORA-00202: control file:
'+FRA/orcl/controlfile/current.256.695531381'
ORA-17503: ksfdfopn:2 Failed to open file
+FRA/orcl/controlfile/current.256.695531381
ORA-15012: ASM file
'+FRA/orcl/controlfile/current.256.695531381' does not exist
NOTE: dependency between database orcl and diskgroup resource
ora.DATA.dg is established
Sat Aug 22 03:18:05 2009
Checker run found 1 new persistent data failures
ORA-205 signalled during: ALTER DATABASE MOUNT...
Sat Aug 22 03:18:08 2009
Shutting down instance (abort)
```

## **Practice 16-4: Recovering from the Loss of a Control File (continued)**

```
License high water mark = 1
USER (ospid: 17765) : terminating the instance
Instance terminated by USER, pid = 17765
Sat Aug 22 03:18:08 2009
Instance shutdown complete
$
```

- 4) Notice that the missing control file is the one from your **+FRA** disk group. You know you also have a control file on the **+DATA** disk group. You can perform a recovery by restoring from the control file that is in the **+DATA** disk group, but you need to know the file name. Using **asmcmd**, determine the name of the control file in the **+DATA** disk group.
  - a) Open a new terminal window and set your environment for your **+ASM** instance using **oraenv**.

```
$ . oraenv
ORACLE_SID = [oracle] ? +ASM
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is
/u01/app/oracle
```

- b) Start **asmcmd** and use the **ls** command to determine the name of the control file in the **+DATA** disk group (this file will be in the **+data/orcl/controlfile** directory).

```
$ asmcmd
ASMCMD> ls +data/orcl/controlfile
Current.260.695209463
ASMCMD>
```

- c) Make a note of this name along with its full path because you will need this information for the next step.
- 5) In another terminal window, connect to **RMAN** and use the following command to restore your control file:  
**restore controlfile from  
'+DATA/orcl/controlfile/yourcontrolfilename';**  
Then mount and open your database.
  - a) Set your environment for your **orcl** database using **oraenv** and then connect to **RMAN**.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$ rman target /
Recovery Manager: Release 11.2.0.2.0 - Production on Sat Aug
22 03:27:29 2009
```

## **Practice 16-4: Recovering from the Loss of a Control File (continued)**

```
Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.
```

```
connected to target database (not started)
```

```
RMAN>
```

- b) First, you need to put your database into NOMOUNT mode.

```
RMAN > startup nomount

Oracle instance started

Total System Global Area      577511424 bytes

Fixed Size                  1337984 bytes
Variable Size                469763456 bytes
Database Buffers             100663296 bytes
Redo Buffers                 5746688 bytes

RMAN>
```

- c) Restore the control file from the existing control file on the +DATA disk group.

**Note:** Use the file name determined in step 4.

```
RMAN> restore controlfile from
'+DATA/orcl/controlfile/current.260.695209463';

Starting restore at 22-AUG-09
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=23 device type=DISK

channel ORA_DISK_1: copied control file copy
output file name=+DATA/orcl/controlfile/current.260.695209463
output file name=+FRA/orcl/controlfile/current.256.695532623
Finished restore at 22-AUG-09

RMAN>
```

- d) Mount your database.

```
RMAN> alter database mount;
```

```
database mounted
```

- e) Open your database.

```
RMAN> alter database open;
```

```
database open
```

***Practice 16-4: Recovering from the Loss of a Control File  
(continued)***

- 6) Open a browser and log in to Enterprise Manager as the **dba1** user. On the Database home page, confirm that your database is again up and running.
- 7) Exit all sessions and close all windows.

## **Practices for Lesson 17**

**Background:** In the recent past, you received a number of questions about the HR schema. To analyze them without interfering in daily activities, you decide to use the Data Pump Wizard to export the HR schema to file. When you perform the export, you are not sure into which database you will be importing this schema.

In the end, you learn that the only database for which management approves an import is the orcl database. So you perform the import with the Data Pump Wizard, remapping the HR schema to DBA1 schema.

Then you receive two data load requests for which you decide to use SQL\*Loader.

## **Practice 17-1: Moving Data Using Data Pump**

In this practice, you first grant the DBA1 user the privileges necessary to provide access to the DATA\_PUMP\_DIR directory. You then export the HR schema so that you can then import the tables that you want into the DBA1 schema. In the practice, you import only the EMPLOYEES table at this time.

- 1) First, you need to grant to the DBA1 user the appropriate privileges on the DATA\_PUMP\_DIR directory and create the users and roles required for this practice. A script exists that performs all the steps required to configure your environment for this practice.
  - a) Review the **lab\_17\_01\_01.sql** script, which grants the DBA1 user privileges on the DATA\_PUMP\_DIR directory and performs other configurations to your environment, by executing the following in your **labs** directory:

```
$ cat lab_17_01_01.sql
```

- b) The **lab\_17\_01\_01.sh** script calls the **lab\_17\_01\_01.sql** script. Execute the **lab\_17\_01\_01.sh** script now:

```
$ ./lab_17_01_01.sh
Create HR_TEST tablespace, HR_TEST_ROLE role, the HR_TEST
users
```

Tablespace created.

User created.

Role created.

Grant succeeded.

Grant succeeded.

Table altered.

Grant succeeded.

Grant succeeded.

```
You may now login as: hr_test/oracle_4U
spool off
$
```

## **Practice 17-1: Moving Data Using Data Pump (continued)**

- 2) Log in to Enterprise Manager as the **DBA1** user in the **Normal** role and export the HR schema.
- Invoke Enterprise Manager as the **DBA1** user as the **Normal** role for your **orcl** database. The **Connect As** setting should be Normal.
  - Select **Data Movement** > Move Row Data > **Export to Export Files**.
  - Select **Schemas**, enter **oracle** as Username and Password, select **Save as Preferred Credential**, and then click **Continue**.
  - On the Export: Schemas page, click **Add**, select the **HR** schema, and then click the **Select** button.
  - You see that HR is now in the list of schemas. Click **Next**.

The screenshot shows the 'Export: Schemas' step of the Data Pump wizard. At the top, there is a progress bar with five steps: Schemas, Options, Files, Schedule, and Review. The 'Schemas' step is highlighted with a blue circle. Below the progress bar, the title 'Export: Schemas' is displayed. Underneath it, the database is set to 'orcl.oracle.com'. On the right side, there are 'Cancel', 'Finish', and 'Step 1 of 5' buttons, with 'Next' being the one highlighted with a red box. In the main area, there is a 'Remove' button and a 'Select Schemas' dropdown. Inside the dropdown, 'Select Schemas' is highlighted with a green triangle, and 'HR' is checked with a blue circle. There is also an 'Add' button.

- On the Export: Options page, select **DATA\_PUMP\_DIR** from the Directory Objects drop-down list, and enter **hrexp.log** as Log File.

The screenshot shows the 'Optional File' step of the Data Pump wizard. The title 'Optional File' is at the top. Underneath, there is a checkbox for 'Generate Log File' which is checked. Next to it is a dropdown for 'Directory Object' containing 'DATA\_PUMP\_DIR', with a 'Create Directory Object' button next to it. Below that is a 'Log File' input field containing 'hrexp.log'. On the right side, there are 'Cancel', 'Finish', 'Back', and 'Step 3 of 5' buttons, with 'Next' being the one highlighted with a red box.

- Review Advanced Options (but do not change), and then click **Next**.
- On the Export: Files page, select **DATA\_PUMP\_DIR** from the Directory Object drop-down list, enter **HREXP%U.DMP** as File Name, and then click **Next**.

The screenshot shows the 'Export: Files' step of the Data Pump wizard. The title 'Export: Files' is at the top. Underneath, there is a 'Database' dropdown set to 'orcl.oracle.com' and a 'Create Directory Object' button. Below that is a table with three columns: 'Select Directory Object', 'File Name', and 'Maximum File Size (MB)'. In the 'Select Directory Object' column, 'DATA\_PUMP\_DIR' is selected. In the 'File Name' column, 'HREXP%U.DMP' is entered. A note below the table says: 'You can wildcard a set of dump files using "%U" in the filename. A "%D" wildcard will be replaced with the date the job is run using a YYMMDD format.' On the right side, there are 'Cancel', 'Finish', 'Back', and 'Step 3 of 5' buttons, with 'Next' being the one highlighted with a red box.

## Practice 17-1: Moving Data Using Data Pump (continued)

- i) On the Export: Schedule page, enter **hrexp** as Job Name and **Export HR schema** as Description, accept the immediate job start time, and then click **Next**.

**Export: Schedule**

Database **orcl.oracle.com**

Specify a name and description for the export job. Specify a date to start the job.

**Job Parameters**

Job Name **hrexp**  
Description **Export HR schema**

**Job Schedule**

Time Zone **(UTC-06:00) US Central Time**

**Start**

**Immediately**  
 **Later**

- j) On the Export: Review page, click **Show PL/SQL** and review the PL/SQL that the Export Wizard helped you to create.
- k) Click **Submit Job** to submit the job.
- l) Click the link to the HREXP job to monitor the progress. Refresh your browser until you see that the job has successfully completed then move on to the next step.

<b>Summary</b>	
Status	<b>Succeeded</b>
Scheduled	<b>Jul 14, 2009 2:44:00 PM (UTC+07:00)</b>
Started	<b>Jul 14, 2009 2:44:00 PM (UTC+07:00)</b>
Ended	<b>Jul 14, 2009 2:45:45 PM (UTC+07:00)</b>
Elapsed Time	<b>105 seconds</b>
Notification	<b>No</b>

- 3) Now, import the **EMPLOYEES** table from the exported **HR** schema into the **DBA1** schema. To get a feeling for the command-line interface, you can use the **impdp** utility from the command line to import the **EMPLOYEES** table into the **DBA1** user schema.
- a) Ensure that your environment is configured for the **orcl** database by running **oraenv**.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

- b) Enter the following entire command string. Do not press [Enter] before reaching the end of the command:
- ```
impdp dba1/oracle_4U DIRECTORY=data_pump_dir
DUMPFILE=HREXP01.DMP REMAP_SCHEMA=hr:dba1
TABLES=hr.employees LOGFILE=empimport.log
```

## **Practice 17-1: Moving Data Using Data Pump (continued)**

```
$ impdp dba1/oracle_4U DIRECTORY=data_pump_dir  
DUMPFILE=HREXP01.DMP REMAP_SCHEMA=hr:dba1 TABLES=hr.employees  
LOGFILE=empimport.log  
  
Import: Release 11.2.0.1.0 - Production on Thu Jul 16 00:46:18  
2009  
  
Copyright (c) 1982, 2009, Oracle and/or its affiliates. All  
rights reserved.  
  
Connected to: Oracle Database 11g Enterprise Edition Release  
11.2.0.1.0 - Production  
With the Partitioning, Automatic Storage Management, OLAP,  
Data Mining  
and Real Application Testing options  
Master table "DBA1"."SYS_IMPORT_TABLE_01" successfully  
loaded/unloaded  
Starting "DBA1"."SYS_IMPORT_TABLE_01": dba1/*********  
DIRECTORY=data_pump_dir DUMPFILE=HREXP01.DMP  
REMAP_SCHEMA=hr:dba1 TABLES=hr.employees LOGFILE=empimport.log  
Processing object type SCHEMA_EXPORT/TABLE/TABLE  
Processing object type SCHEMA_EXPORT/TABLE(TABLE_DATA  
. . imported "DBA1"."EMPLOYEES" 16.81  
KB 107 rows  
Processing object type  
SCHEMA_EXPORT/TABLE/GRAnt/OWNER_GRANT/OBJECT_GRANT  
Processing object type SCHEMA_EXPORT/TABLE/INDEX/INDEX  
Processing object type  
SCHEMA_EXPORT/TABLE/CONSTRAINT/CONSTRAINT  
Processing object type  
SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS  
Processing object type SCHEMA_EXPORT/TABLE/COMMENT  
Processing object type  
SCHEMA_EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT  
ORA-39083: Object type REF_CONSTRAINT failed to create with  
error:  
ORA-00942: table or view does not exist  
Failing sql is:  
ALTER TABLE "DBA1"."EMPLOYEES" ADD CONSTRAINT "EMP_JOB_FK"  
FOREIGN KEY ("JOB_ID") REFERENCES "DBA1"."JOBS" ("JOB_ID")  
ENABLE  
  
ORA-39083: Object type REF_CONSTRAINT failed to create with  
error:  
ORA-00942: table or view does not exist  
Failing sql is:  
ALTER TABLE "DBA1"."EMPLOYEES" ADD CONSTRAINT "EMP_DEPT_FK"  
FOREIGN KEY ("DEPARTMENT_ID") REFERENCES "DBA1"."DEPARTMENTS"  
("DEPARTMENT_ID") ENABLE  
  
Processing object type SCHEMA_EXPORT/TABLE/TRIGGER
```

## **Practice 17-1: Moving Data Using Data Pump (continued)**

```
ORA-39082: Object type TRIGGER:"DBA1"."SECURE_EMPLOYEES"
created with compilation warnings
ORA-39082: Object type TRIGGER:"DBA1"."SECURE_EMPLOYEES"
created with compilation warnings
ORA-39082: Object type TRIGGER:"DBA1"."UPDATE_JOB_HISTORY"
created with compilation warnings
ORA-39082: Object type TRIGGER:"DBA1"."UPDATE_JOB_HISTORY"
created with compilation warnings
Processing object type
SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS
Job "DBA1"."SYS_IMPORT_TABLE_01" completed with 6 error(s) at
00:46:45
```

**Note:** You may see errors on constraints and triggers not being created because only the EMPLOYEES table is imported and not the other objects in the schema. These errors are expected.

- c) You can also verify that the import succeeded by viewing the log file.

```
$ cat /u01/app/oracle/admin/orcl/dpdump/empimport.log
```

- 4) Confirm that the EMPLOYEES table has been loaded into the DBA1 schema by logging in to SQL\*Plus as the **DBA1** user and selecting data from the **EMPLOYEES** table.
  - a) Log in to SQL\*Plus as the **DBA1** user.  
**Note:** Remember to use oraenv to set your environment to the orcl database if you have not already done so in your terminal window.

```
$ sqlplus dba1

SQL*Plus: Release 11.1.0.6.0 - Production on Sun Aug 31
16:54:32 2008

Copyright (c) 1982, 2007, Oracle. All rights reserved.

Enter Password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 -
Production
With the Partitioning, OLAP, Data Mining and Real Application
Testing options

SQL>
```

- b) Select a count of the rows from the **EMPLOYEES** table in the **DBA1** schema, for verification of the import.

### **Practice 17-1: Moving Data Using Data Pump (continued)**

```
SQL> select count(*) from employees;  
  
COUNT (*)  
-----  
      107  
SQL>
```

## Practice 17-2: Loading Data Using SQL\*Loader

In this practice, you load data into the PRODUCT\_MASTER table by using SQL\*Loader via Enterprise Manager Database Control. Data and control files are provided.

- 1) As the **DBA1** user, use Enterprise Manager to load the **lab\_17\_02\_01.dat** data file. This data file contains rows of data for the **PRODUCT\_MASTER** table. The **lab\_17\_02\_01.ctl** file is the control file for this load.  
Optionally, view the **lab\_17\_02\_01.dat** and **lab\_17\_02\_01.ctl** files to learn more about their structure before going further.
  - a) Invoke Enterprise Manager as the **DBA1** user as the **Normal** role for your **orcl** database.
  - b) Select **Data Movement > Move Row Data > Load Data from User Files**.
  - c) Click **Use Existing Control File**. If not already entered, enter **oracle** as Username and as Password, click **Save as Preferred Credential**, and then click **Continue**.

**Load Data: Generate Or Use Existing Control File**

Database **orcl.oracle.com** Cancel Continue

Automatically Generate Control File  
A control file will be generated after you define the structure of the data file.

Use Existing Control File  
Allows you to use an existing control file that defines the structure of the data file.

**Host Credentials**

\* Username **oracle**  
\* Password **\*\*\*\*\***  
 Save as Preferred Credential

- d) On the Load Data: Control File page, enter **/home/oracle/labs/lab\_17\_02\_01.ctl** as the control file name and path, or use the flashlight icon to select this control file. Click **Next**.

**Load Data: Control File**

Database **orcl.oracle.com** Cancel Finish Step 1 of 6 Next

A control file is used to describe what will be loaded and how. Specify the full path and name of the control file on the database server machine.

**/home/oracle/labs/lab\_17\_02\_01.ctl** flashlight icon

- e) On the Load Data: Data File page, click **Provide the full path and name on the database server machine** and enter **/home/oracle/labs/lab\_17\_02\_01.dat** as the data file name and path, or use the flashlight icon to select this data file. Click **Next**.

**Load Data: Data File**

Database **orcl.oracle.com** Cancel Finish Back Step 2 of 6 Next

How would you like to specify the file containing the data?

The data file is specified in the control file

Provide the full path and name on the database server machine  
**/home/oracle/labs/lab\_17\_02\_01.dat** flashlight icon

## Practice 17-2: Loading Data Using SQL\*Loader (continued)

- f) On the Load Data: Load Method page, select **Conventional Path**, and then click **Next**.

**Load Data: Load Method**

Database **orcl.oracle.com**

Conventional Path  
Runs SQL INSERT statements to load data into database tables. Use this option if none of the choices below are appropriate.

Direct Path (faster)  
Formats data blocks and writes them directly to the database files. No writing to clustered tables. No other writing to destination tables in progress. No SQL in the control file.

Parallel Direct Path (fastest)  
Writes data into the same table or into the same partition table in concurrent sessions. Data is only appended. Triggers and constraints are disabled. No indexes maintained.

**Cancel** **Finish** **Back** Step 3 of 6 **Next**

- g) On the Load Data: Options page, accept all defaults, but enter **/home/oracle/labs/lab\_17\_02\_01.log** as the log file name and path. Review the advanced options if you want, but do not change any, and then click **Next**.

**Optional Files**

Generate bad file where records which contain errors are stored  
Bad File

Generate discard file where rejected and uninserted records are stored  
Discard File

Generate log file where logging information is to be stored  
Log File **/home/oracle/labs/lab\_17\_02\_01.log** 

**Show Advanced Options**

**Cancel** **Finish** **Back** Step 4 of 6 **Next**

- h) On the Load Data: Schedule page, enter **lab\_17\_02\_01** as Job Name and **Load data into the PRODUCT\_MASTER table** as Description. Let the job start immediately, and then click **Next**.

**Load Data: Schedule**

Database **orcl.oracle.com**

Specify a name and description for the load data job. Specify a date to start the job.

**Job Parameters**

Job Name **lab\_17\_02\_01**  
Description **Load data into the PRODUCT\_MASTER table**

**Job Schedule**

Time Zone **(UTC-06:00) US Central Time**

Start

Immediately  
 Later

**Cancel** **Back** Step 5 of 6 **Next**

- i) On the Load Data: Review page, review the loading information and parameters, and then click **Submit Job**.

## **Practice 17-2: Loading Data Using SQL\*Loader (continued)**

- j) Click the link to the `LAB_17_02_01` job to monitor the progress. After the job shows as successfully completed, move on to the next step.

| Summary      |                                            |
|--------------|--------------------------------------------|
| Status       | <b>Succeeded</b>                           |
| Scheduled    | <b>Jul 14, 2009 2:55:29 PM (UTC+07:00)</b> |
| Started      | <b>Jul 14, 2009 2:55:29 PM (UTC+07:00)</b> |
| Ended        | <b>Jul 14, 2009 2:55:37 PM (UTC+07:00)</b> |
| Elapsed Time | <b>8 seconds</b>                           |
| Notification | <b>No</b>                                  |

- k) Confirm your results by viewing your `lab_17_02_01.log` file in your `/home/oracle/labs` directory.
- 2) As the **INVENTORY** user, load data into the **PRODUCT\_ON\_HAND** table by using SQL\*Loader command line. The `lab_17_02_02.dat` data file contains rows of data for the **PRODUCT\_ON\_HAND** table. The `lab_17_02_02.ctl` file is the control file for this load.  
Optionally, view the `lab_17_02_02.dat` and `lab_17_02_02.ctl` files to learn more about their structure before going further.
- Open a terminal window and navigate to the `/home/oracle/labs` directory.
  - Ensure that your environment is configured for the `orcl` database by running `oraenv`.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
$
```

- c) Enter the following SQL\*Loader command (in continuation, without pressing [Enter] before reaching the end of the command):

```
sqlldr userid=inventory/oracle_4U control=lab_17_02_02.ctl
log=lab_17_02_02.log data=lab_17_02_02.dat
```

```
$ sqlldr userid=inventory/oracle_4U control=lab_17_02_02.ctl
log=lab_17_02_02.log data=lab_17_02_02.dat

SQL*Loader: Release 11.2.0.1.0 - Production on Tue Jul 14
14:56:44 2009

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All
rights reserved.

Commit point reached - logical record count 64
Commit point reached - logical record count 83
$
```

### ***Practice 17-2: Loading Data Using SQL\*Loader (continued)***

- d) Confirm your results by viewing your `lab_17_02_02.log` file in your `/home/oracle/labs` directory.

## **Practices for Lesson 18**

## **Practice 18-1: Investigating a Critical Error**

In this practice, you investigate a critical error. A data block has been corrupted. Use the Enterprise Manager Support Workbench, Health Checkers, and advisors to react to the error.

- 1) Set up the database for the practice. The setup creates a tablespace for the practice, and performs a tablespace backup. Run the **lab\_18\_01\_01.sh** script. The scripts for this practice are in the **\$HOME/labs** directory.

```
$ cd $HOME/labs  
$ ./lab_18_01_01.sh
```

- 2) Run the **lab\_18\_01\_02.sql** script from SQL\*Plus connected as **sysdba** to create the critical error. The script prompts you for a block number; enter the block number given by the script. Notice the error message. In our scenario, the error message could originally be seen by anyone and not reported immediately to the DBA.

**Note:** Remember to use **oraenv** to set your environment to the **orcl** database if you have not already done so in your terminal window.

```
$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.1.0 Production on Wed Jul 15 01:30:42
2009

Copyright (c) 1982, 2009, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 -
Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options

SQL> @lab_18_01_02.sql
Connected.

FILE_NO    BLOCK_NO
-----  -----
      9        129
```

Write down this Block Number because you will need to enter this number when prompted.

```
System altered.

'Enter Block number when prompted'
Enter value for block_no: 129
0+1 records in
0+1 records out
80 bytes (80 B) copied, 6.693e-05 seconds, 1.2 MB/s
0+1 records in
0+1 records out
```

## Practice 18-1: Investigating a Critical Error (continued)

```
79 bytes (79 B) copied, 6.3419e-05 seconds, 1.2 MB/s

SELECT * from js.jscopy
*
ERROR at line 1:
ORA-01578: ORACLE data block corrupted (file # 9, block # 129)
ORA-01110: data file 9:
  '/u01/app/oracle/oradata/orcl/jstbs01.dbf'

Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.1.0 - Production
With the Partitioning, Automatic Storage Management, OLAP,
Data Mining
and Real Application Testing options
$
```

- 3) Log in to Enterprise Manager as the **DBA1** user in the **SYSDBA** role, and then view the alerts on the Database home page and investigate the alert details. When the incident appears in the alerts, click the Active Incidents link.

You should see one or more critical alerts. Depending on the timing, you may see one or more of the following:

| Severity | Category     | Name                         | Impact | Message                                                                                                                                                             | Alert Triggered            |
|----------|--------------|------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| ✗        | Data Failure | Data Failure Detected        |        | <a href="#">Checker run found 2 new persistent data failures.</a>                                                                                                   | Jul 15, 2009<br>1:32:46 AM |
| ✗        | Incident     | Oracle Data Block Corruption |        | <a href="#">An Oracle data block corruption detected in /u01/app/oracle/diag/rdbms/orcl/orcl/alert/log.xml at time/line number: Wed Jul 15 01:30:50 2009/18258.</a> | Jul 15, 2009<br>1:32:46 AM |
| ⚠        | User Audit   | Audited User                 |        | <a href="#">User SYS logged on from edrsr12p1.us.oracle.com.</a>                                                                                                    | Jul 15, 2009<br>1:17:22 AM |

The number of Active Incidents may not match the number of alerts immediately.

Click the **Active Incidents** link.



- 4) Investigate the details of the problem.

On the Support Workbench page and **Problems** tab, expand the problem with the description ORA 1578.

Click the incident number of the most recent (first listed) incident.

## **Practice 18-1: Investigating a Critical Error (continued)**

- 5) Examine the Incident Details page. Notice that the SQL text of the statement that received the error is listed, and the session information. Depending on the error this information can be very helpful in troubleshooting the error.

- 6) View a trace file.

Click the **eyeglasses** icon to view the first trace file listed. If you are prompted for Host Login Credentials, enter user `oracle` and password `oracle` and click Continue.

**Note:** If you do not see a trace file listed, please be patient. It can take a few minutes before the trace file appears in the list.

On the Contents page, you can see the trace file. Sections of the trace file can be expanded or collapsed. The trace file is intended for Oracle internal use. Click **OK**.

Click **Support Workbench** link in the breadcrumb at the top of the page to return to the Support Workbench page.

- 7) Determine how to resolve the problem.

Click **ID** of the ORA 1578 problem.

| Select Details                                                                                                   |          |             |                     |
|------------------------------------------------------------------------------------------------------------------|----------|-------------|---------------------|
|                                                                                                                  | ID       | Description | Number Of Incidents |
| <input type="checkbox"/>  Hide | <u>1</u> | ORA 1578    | 1                   |

- 8) When the problem details page appears, notice that the Investigate and Resolve section has two tabs that allow you to pursue the solution yourself or enlist the aid of Oracle Support.



The screenshot shows the 'Investigate and Resolve' section of the Oracle Support Workbench. It includes tabs for 'Self Service' and 'Oracle Support'. Under 'Assess Damage', there are links for 'Checker Findings', 'Run Checkers', and 'Database Instance Health'. Under 'Diagnose', there are links for 'Alert Log', 'Related Problems Across Topology', 'Diagnostics for Last Dumped Incident', and 'Go to My Oracle Support and Research'. Under 'Resolve', there are links for 'SQL Repair Advisor' and 'Data Recovery Advisor'.

## **Practice 18-1: Investigating a Critical Error (continued)**

- 9) Get Checker information about the problem. Click **Support Workbench** in the breadcrumb at the top of the page to return to the Support Workbench page. Click **Checker Findings** tab.

Support Workbench  
Page Refreshed July 15, 2009 3:00:50 AM GMT+07:00 [Refresh]  
Problems (1) **Checker Findings (3)** Packages (0)  
Search  
Description Damage Translation Status Time Detected  
Open All Go

- 10) Get advise. Under the Checker Findings tab, in the Data Corruption section, Select the finding with the description that starts with “Datafile …” and click **Launch Recovery Advisor**.

Data Corruption  
Select findings and click on the "Launch Recovery Advisor" button to repair those findings.  
[Launch Recovery Advisor]  
Select All | Select None | Expand All | Collapse All  
Select Description Priority Damage Translation Incident ID Status Time Detected  
All Findings  
Datafile 9: '/u01/app/oracle/oradata/orcl/jstbs01.dbf' contains one or more corrupt blocks  
High Some objects in tablespace JSTBS might be unavailable 18345 Open July 15, 2009 1:31:07 AM GMT+07:00

**Note:** The data file number given in the description is the same as the FILE\_NO shown when you ran the lab\_18\_01\_02.sql script in step 2.

- On the View and Manage Failures page, confirm that the failure “Datafile …” is selected, and then click Advise.
  - The Recovery Advice page recommends an RMAN script. This script will perform a block media recovery. Click Continue.
  - The Review page shows the failures that will be resolved. Click Submit Recovery Job.
  - The Processing page may appear briefly, after which the Job Activity page appears. The Job Status shows Running. Refresh the page after a few moments and repeat until the page shows No Jobs Found.
- 11) Open a terminal window and log in to SQL\*Plus as the **js** user with a password of **oracle\_4U**. Select from the **jscopy** table and ensure that you do not see any further block corruption errors.

**Note:** Remember to use oraenv to set your environment to the orcl database if you have not already done so in your terminal window.

```
SQL> select * from jscopy;  
EMPLOYEE_ID FIRST_NAME LAST_NAME  
-----  
EMAIL PHONE_NUMBER HIRE_DATE  
JOB_ID SALARY
```

## **Practice 18-1: Investigating a Critical Error (continued)**

```
-----  
COMMISSION_PCT MANAGER_ID DEPARTMENT_ID  
-----  
    100 Steven                 King  
SKING                      515.123.4567      17-JUN-87  
AD_PRES                    24001  
                           90  
  
    101 Neena                 Kochhar  
NKOCHHAR                   515.123.4568      21-SEP-89 AD_VP  
17001  
    100                         90  
...  
...
```

- 12) When finished, run the **lab\_18\_01\_12.sh** script from the **\$HOME/labs** directory to remove the objects created in this practice.

```
§ cd $HOME/labs  
§ ./lab_18_01_12.sh
```

## ***Practice 18-1: Investigating a Critical Error (continued)***