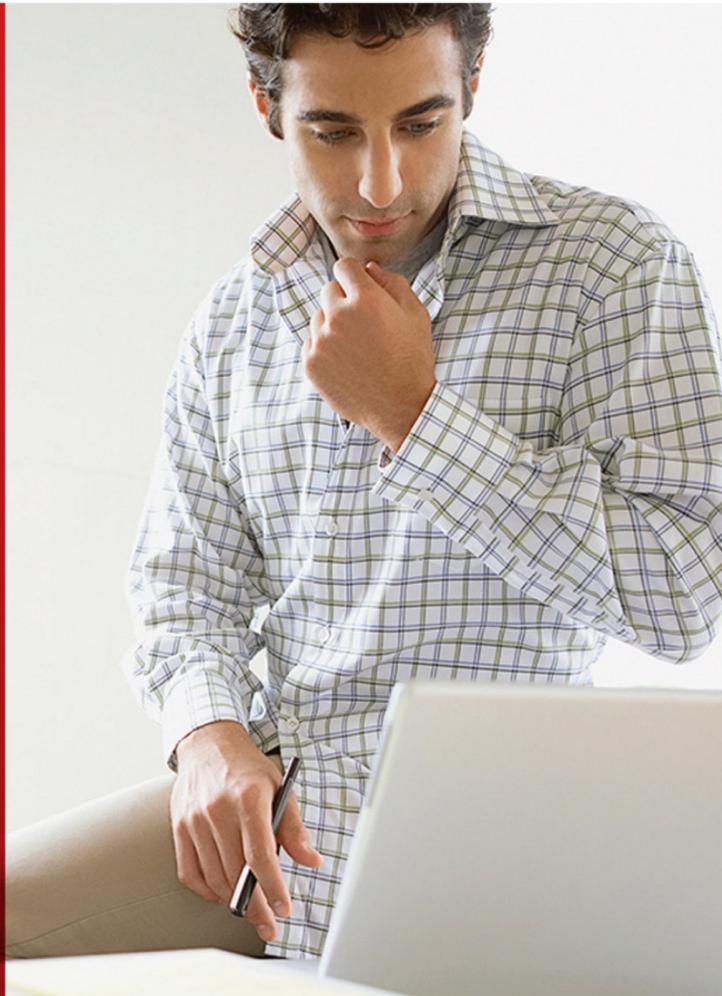




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Oracle Database 12c: Administration Workshop

Activity Guide
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Practices for Lesson 1: Introduction

Chapter 1

Practices for Lesson 1

There are no practices for this lesson.

Practices for Lesson 2: Exploring Oracle Database Architecture

Chapter 2

Practices for Lesson 2: Overview

Practices Overview

In this practice, you review Oracle Database architecture concepts and answer questions to test your knowledge of the lesson topics.

Practice 2-1: Exploring the Oracle Database Architecture

Fill in the blanks with the correct answers.

1. The two main components of a basic Oracle Database system are:

_____ and _____

Hint: See page 2-3

2. An instance consists of _____ and _____ processes.

Hint: See page 2-3

3. A session is a connection between the _____ process and the _____ process.

Hint: See page 2-5

4. Name the main components of the SGA:

- _____
- _____
- _____
- _____
- _____
- _____
- _____

Hint: See page 2-6

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

- _____
- _____
- _____
- _____
- _____
- _____

Hint: See page 2-26

6. The _____ process writes dirty buffers to data files.

Hint: See page 2-28

7. The _____ process writes redo entries to online redo log files.

Hint: See page 2-30

8. The primary files associated with an Oracle database are:

- _____
- _____
- _____

Additional important files are:

- _____
- _____
- _____
- _____
- _____

Hint: See page 2-38

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

- _____
- _____
- _____
- _____
- _____

Hint: See page 2-40

10. The _____ process copies redo log files to an archive destination.

Hint: See page 2-37

11. The _____ contains data and control information for a server or background process.

Hint: See page 2-15

12. The logical tablespace structure is associated with the physical _____ files on disk.

Hint: See page 2-40

13. LGWR writes when:

- _____
- _____
- _____
- _____

Hint: See page 2-30

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 2-6, 2-10, 2-15, 2-24, 2-26, 2-32

Practices for Lesson 3: Oracle Database Management Tools

Chapter 3

Practices for Lesson 3: Overview

Practices Overview

Background: The Oracle software has been installed and a database has been created.

Practice 3-1: Registering the orcl Database in Oracle Enterprise Manager Cloud Control

In this practice, you use Oracle Enterprise Manager Cloud Control (Cloud Control) to register the `orcl` database.

1. Invoke Cloud Control and log in as the `SYSMAN` user. Which port number does this database use?

Answer: Cloud Control uses port 7802 by default.

- a. Click the Firefox browser icon on the top toolbar to launch Firefox.
- b. Enter the URL `https://localhost:7802/em`. The format for this URL is `https://<machine_name>:<port_number>/em`.

Note: The first time you connect, you get an “Untrusted Connection” message (or something similar depending on the browser and version) and an Alert window may appear. To get past this, you add an exception and accept the certificate.

The screenshot shows a Firefox browser alert. At the top is a yellow icon of a person holding a shield. Below it, the text "This Connection is Untrusted" is displayed in bold. A message follows: "You have asked Firefox to connect securely to **localhost:7802**, but we can't confirm that your connection is secure." Another message below states: "Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified." At the bottom left is a button labeled "Get me out of here!". To the right are two options: "► Technical Details" and "► I Understand the Risks".

- i) Click **I understand the Risks**.
- ii) Click **Add Exception**.

► I Understand the Risks

If you understand what's going on, you can tell Firefox to start trusting this site's identification. **Even if you trust the site, this error could mean that someone is tampering with your connection.**

Don't add an exception unless you know there's a good reason why this site doesn't use trusted identification.

Add Exception...

- iii) Ensure that the option to permanently store this exception is selected and then click **Confirm Security Exception**.



- c. In the Cloud Control Login box, enter **sysman** in the User Name field, **oracle_4U** in the Password field, and then click **Login**.



2. The Accessibility Preference page is displayed. Select the appropriate preference and click "Save and Continue."

The screenshot shows the 'Accessibility Preference' page of Oracle Enterprise Manager Cloud Control 12c. At the top, it says 'Your accessibility preferences are presented because this is your first login. You can set these now, or at anytime by using Username menu.' Below this are several checkboxes:

- I use a screen reader (Accessibility-specific constructs are added to improve behavior with a screen reader)
Note: For screen reader support, additional configuration is required by your system administrator. See [Help](#) for more information.
- I use high contrast settings
- I use large fonts
- Show me the Accessibility Preference options after I log in

At the bottom are two buttons: 'Help' on the left, and 'Save and Continue' and 'I'll deal with this later' on the right.

3. At the first login to Cloud Control, you will be asked to accept the license agreement. Click **I Accept**.
4. Also, at the first the login to Cloud Control, you will be asked to select a Home page from several pages. Click the radio button below the **Summary** view. Note that this is the assumed starting point for any subsequent logins.
5. Register your local database named `orc1` with Cloud Control.
 - a. Expand **Targets** and select **Databases**.
 - b. Select **Search List**.
 - c. On the Databases page, note that there are no databases. Expand **Add** and click **Oracle Database**.

The screenshot shows the 'Databases' page of Oracle Enterprise Manager Cloud Control 12c. The top navigation bar includes links for Enterprise, Targets, Favorites, and History. Below the navigation is a search bar with a 'Find Name' input field and a 'Search' button. Underneath is a toolbar with buttons for View, Add (which is highlighted with a red box), Remove, and Configure. A table below shows a single row with the column 'Name' and the value 'No Databases found'.

- d. On the "Database Discovery: Search Criteria" page, use the Search icon to select your host target on the Search Targets page. Click **Next**.

- e. In the Databases section, select the `orcl` database.
- f. Enter `oracle_4U` in the Monitor Password field for the `orcl` database. Click **Test Connection**.

The screenshot shows the 'Databases' section of the Oracle Enterprise Manager interface. A table lists databases with columns for Target Name, Monitor Username, Monitor Password, Role, and Target Group. The 'orcl' database is selected, and its details are shown in the table. The 'Monitor Password' field contains '*****' and is highlighted with a red box. The 'Test Connection' button is also highlighted with a red box.

- g. You receive a confirmation message that the connection test was successful. Click **OK**.
- h. Click **Next**.
- i. Click **Save**.
- j. On the Target Saving Completed Successfully page, click **Close**.
- k. The `orcl` database appears on the Databases page.

The screenshot shows the 'Databases' section of the Oracle Enterprise Manager interface. The 'orcl' database is listed in the table under the 'Name' column. The table includes columns for Type, Status, Target Version, Incidents, Average Compliance Score, and Member Status Summary.

Name	Type	Status	Target Version	Incidents	Average Compliance Score	Member Status Summary
orcl	Database Instance			0 0 0	n/a	0 0 0 0

- l. Return to the Enterprise Summary page by expanding **Enterprise** and selecting **Summary**.

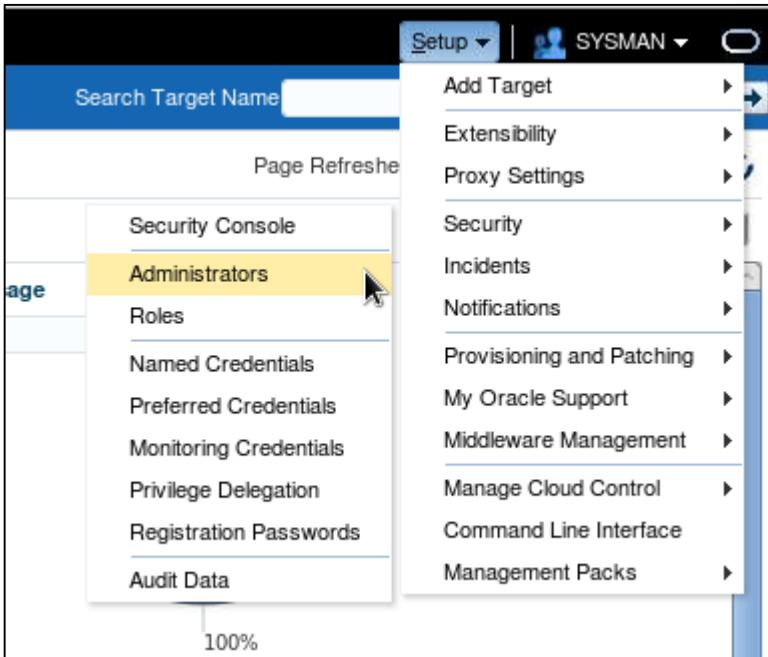
Practice 3-2: Creating an Administrative User

Overview

In this practice, you create an administrative user in Oracle Enterprise Manager Cloud Control. This user has an arbitrary name, and it is not related to the name of any database user. It is a recommended best practice to create and use a separate account for each administration user.

Tasks

1. If you are not logged in to Enterprise Manager Cloud Control, launch Enterprise Manager Cloud Control and log in as the **SYSMAN** user.
2. On the top-right corner of the page, click **Setup > Security > Administrators**.



3. Click **Create** to add the ADMIN user to the Administrators list. This will enable the ADMIN user to perform management tasks by using Enterprise Manager.

Administrators

Administrators are Enterprise Manager users who can login to Enterprise Manager to perform management tasks. The list depends on the privileges and roles assigned to the administrators.

Select	Name	Access	Authentication Type
<input checked="" type="radio"/>	CLOUD_SWLIB_USER	Administrator	Repository
<input type="radio"/>	SYSMAN	Repository Owner	Repository

4. Enter **admin** in the Name field and **oracle_4U** in the Password and Confirm Password fields. Select **Super Administrator**, and then click **Review**.

Create Administrator: Properties

* Name	admin
* Password	*****
* Confirm Password	*****
Password Profile	DEFAULT <input type="button" value="View"/>
You can create additional password profile using database admin pages	
<input type="checkbox"/> Prevent password change	
When checked, administrator is not allowed to change his/her own password.	
<input type="checkbox"/> Expire password now	
When selected, administrator account will be created with expired state. On next logon, administrator will be prompted to change password.	
E-mail Address	Specify one or more e-mail addresses separated by a comma or space. If you are using multiple lines, enter them in the Contact, Location, Department, Cost Center, Line of Business, and Description fields.
Contact	
Location	
Department	
Cost Center	
Line of Business	
Description	
<input checked="" type="checkbox"/> Super Administrator	

5. On the Create Administrator admin: Review page, click **Finish**.
6. A Confirmation message is displayed.

The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface. At the top, there's a navigation bar with links for Enterprise, Targets, Favorites, and History. Below the navigation bar, the title "Security" is displayed. A yellow box contains a "Confirmation" message stating "Administrator ADMIN was created successfully". Below this, under the heading "Administrators", there is a table listing three users:

Select	Name	Access	Authentication Type
<input checked="" type="radio"/>	ADMIN	Super Administrator	Repository
<input type="radio"/>	CLOUD_SWLIB_USER	Administrator	Repository
<input type="radio"/>	SYSMAN	Repository Owner	Repository

7. Expand SYSMAN on the top-right corner and click **Log Out**.
8. Enter **ADMIN** in the User Name field and **oracle_4u** in the Password field. Click **Login**.
9. The Accessibility Preference page is displayed. Select the appropriate preference and click "Save and Continue."
10. The Select Enterprise Manager Home page is displayed. Click the radio button below the **Summary** view.
11. The Enterprise Summary page is displayed. Expand ADMIN and click **Log Out** to exit from Enterprise Manager Cloud Control.

Practice 3-3: Logging In to Oracle Enterprise Manager Database Express

Overview

In this practice, you create a new user and log in to Oracle Enterprise Manager Database Express (EM Express).

Tasks

- It is good practice to create a user separate from `SYS` and `SYSTEM` to perform database administration tasks. Each DBA in your organization should have his or her own privileged account to aid in auditing. Create a privileged user named `DBA1` and grant this user the `CONNECT`, `DBA`, and `SYSDBA` roles by using a script named `lab_03_03_01.sh`. You will examine this script later after discussing user security.

Open a terminal window. Execute the `$LABS/P3/lab_03_03_01.sh` script.

```
$ $LABS/P3/lab_03_03_01.sh
lab_03_03_01 completed. You may now login as:
dba1/oracle_4U
```

- Invoke EM Express and log in as the `DBA1` user. Which port number does this database use? Because each database on the same machine must use a different port, you can discover the port numbers being used by executing the following PL/SQL block.

```
DECLARE
    port NUMBER;
Begin
    port := dbms_xdb_config.gethttpport;
    dbms_output.put_line('DB user port for EM
Express:' || to_char(PORT));
END;
```

- In the Linux command window, set your environment to the `orcl` database by using `oraenv`.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

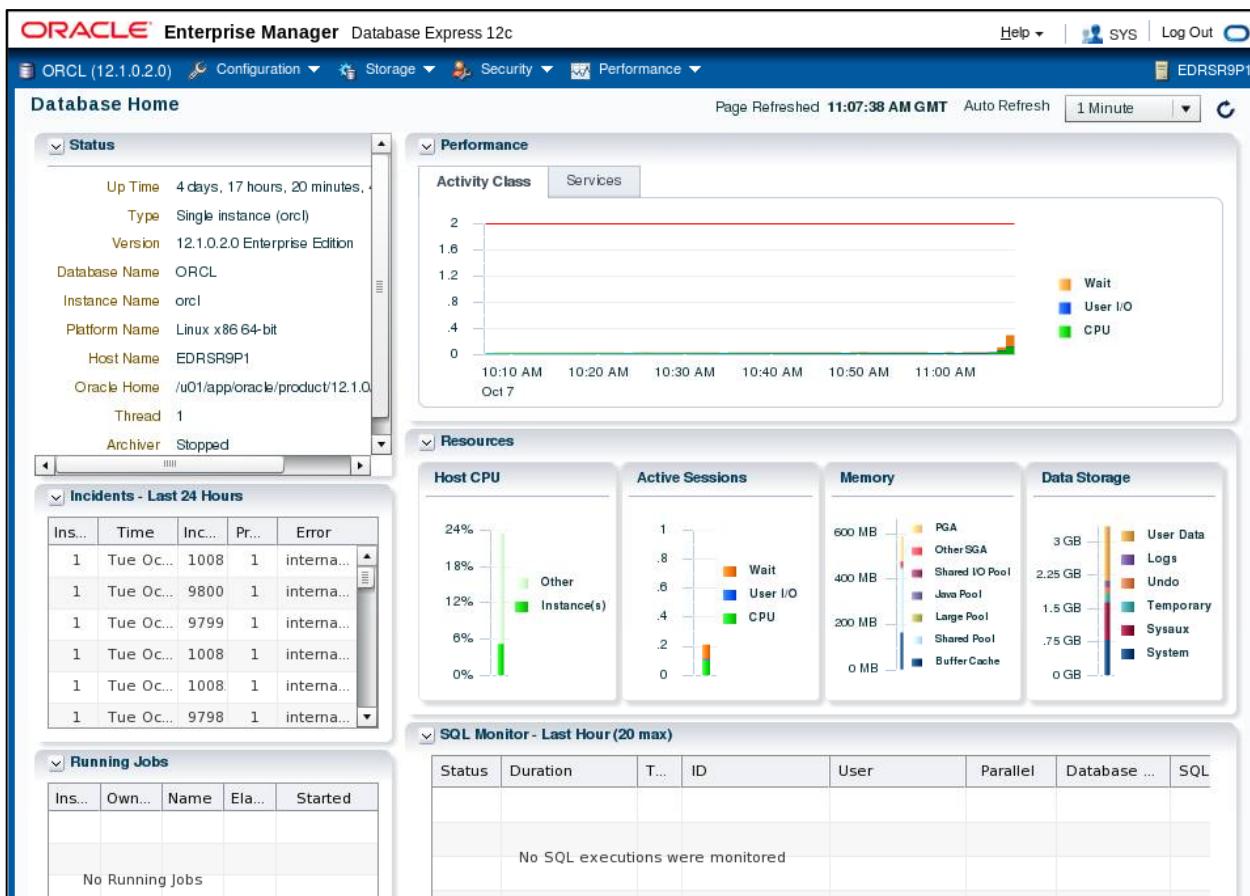
- b. Log in to SQL*Plus as the DBA1 user and execute the \$LABS/P3/lab_03_03_02.sql script, which contains the PL/SQL block shown above.

```
$ sqlplus dba1/oracle_4U as sysdba
...
SQL> @$LABS/P3/lab_03_03_02
DB user port for EM Express:5500

PL/SQL procedure successfully completed.
```

Note: 5500 is the Enterprise Manager Database Express port in this database.

- c. Click the **Firefox Web Browser** icon on the top toolbar to open your web browser as the oracle user.
 - d. Enter the URL below with the port number you found by executing the PL/SQL block. It has the following format:
<http://localhost:portnumber/em>
3. On the Oracle Enterprise Manager Database Express login page, enter **DBA1** as the User Name, enter **oracle_4U** as the Password, and select “**as sysdba**.” Click **Login**.
4. The Database Home page is displayed.



5. Review the data on the Database Home page, and then click **Log Out** on the top-right corner.
6. Log out of SQL*Plus.

Practices for Lesson 4: Managing the Database Instance

Chapter 4

Practices for Lesson 4: Overview

Practices Overview

Background: The Oracle software has been installed and a database has been created. You want to ensure that you can start and stop the database instance and see the application data.

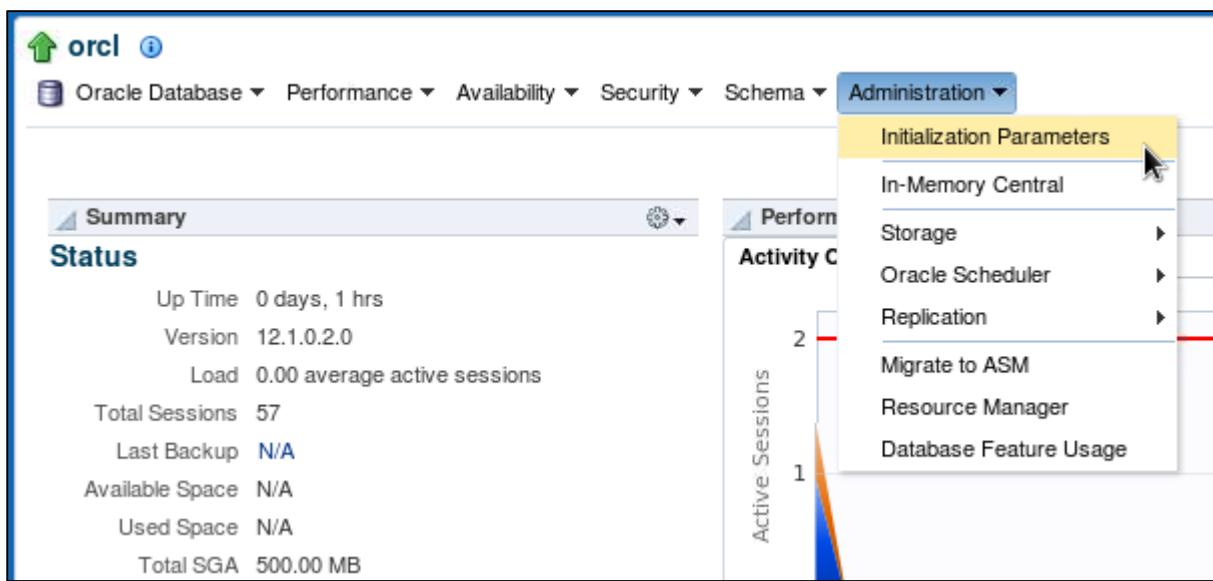
Practice 4-1: Managing the Oracle Instance by Using Oracle Enterprise Manager Cloud Control

In this practice, you use Oracle Enterprise Manager Cloud Control (Cloud Control) to perform the following tasks:

- View and change instance parameters.
 - Shut down the database.
 - Start up the database.
1. Launch Cloud Control and log in as the **SYSMAN** user.
 - a. Click the **Firefox Web Browser** icon on your desktop to open your web browser as the **oracle** user.
 - b. Enter the URL `https://localhost:7802/em`. The format for this URL is `https://<machine_name>:<port_number>/em`.
 - c. In the Cloud Control login box, enter **sysman** as the User Name, enter **oracle_4u** as the Password, and 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?
 - a. Expand **Targets** and select **Databases**.
 - b. Select the **Search List** radio button at the top of the page.
 - c. On the Databases page, click **orcl**.

The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface. The title bar reads "ORACLE Enterprise Manager Cloud Control 12c". The navigation bar includes links for Enterprise, Targets, Favorites, and History. The main menu is titled "Databases" and includes tabs for Performance, Availability, Security, and Schema. Below the tabs are buttons for View (selected), Database Load Map, and Search List. A search bar with a "Find" button and a "Name" input field is present. Under the search bar is a toolbar with "View", "Add", "Remove", and "Configure" buttons. The main content area displays a table with a single row for the database "orcl". The "orcl" entry is highlighted with a red rectangular box. The table has columns labeled "Name" and "orcl".

- d. Navigate to the Initialization Parameters page by selecting **Administration > Initialization Parameters**.



- e. Create a login for SYS (password oracle_4U) as SYSDBA. Select **Save As** and enter ORCL_SYS in the field. This is a named credential. Click **Login**.

The screenshot shows the 'Database Login' dialog box. It contains fields for Username (sys), Password (hidden), Role (SYSDBA), and Save As (ORCL_SYS checked). There are also checkboxes for Set As Preferred Credentials and buttons for Login and Cancel.

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

The screenshot shows the 'Initialization Parameters' page. At the top, there are tabs for Current and SPFile, with Current selected. Below is a message about parameter values used by the running instance(s). A search bar at the top has 'Name' and a text input field containing 'job', which is highlighted with a red rectangle. Below the search bar are buttons for Basic, Modified, Dynamic, and Category, each with an 'All' dropdown. A 'Go' button is to the right of the category dropdown. A note below says 'Filter on a name or partial name'. At the bottom, there's a checkbox for applying changes to the current instance mode to SPFile.

- g. When the JOB_QUEUE_PROCESSES initialization parameter appears, change its value to 15.

The screenshot shows the 'Initialization Parameters' page with the 'SPFile' tab selected. At the top, it says 'The parameter values listed here are currently used by the running instance(s). You can change static parameters in SPFile mode.' Below this is a search bar with 'Name: job' and dropdowns for 'Basic', 'Modified', 'Dynamic', and 'Category'. A checkbox 'Apply changes in current running instance(s) mode to SPFile. For static parameters, you must restart the database.' is checked. The main table has columns: Name, Help, Revisions, Value, Comments, Type, Basic, Modified, Dynamic, and Category. A row for 'job_queue_processes' is selected, showing a value of '15' in the 'Value' column, which is highlighted with a red box. The 'Category' column shows 'Job Queues' with a checkmark. Buttons at the bottom include 'Save to File', 'Execute On Multiple Databases', 'Show SQL', 'Revert', and 'Apply'.

- h. Click **Show SQL** and note the SQL statement that is going to be run.

The screenshot shows the 'Initialization Parameters > Show SQL' page. It displays the SQL command: `ALTER SYSTEM SET job_queue_processes = 15 SCOPE=MEMORY`. Below the command are buttons for 'Execute On Multiple Databases' and 'Return'.

- i. Click **Return** and then click **Apply**.

Question: What is the significance of a check in the Dynamic column?

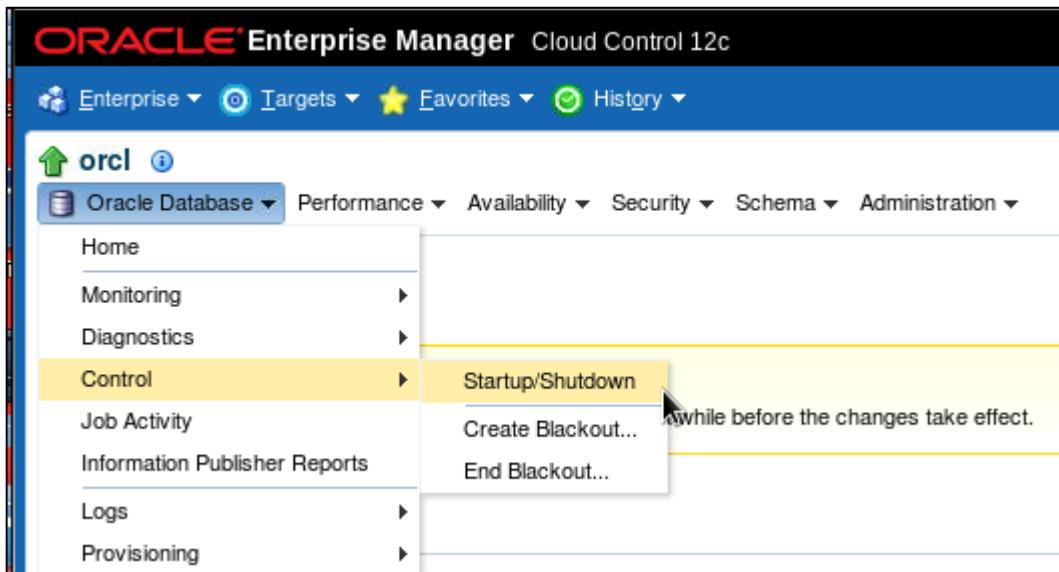
Answer: A “dynamic” parameter can be modified while the database is running.

3. Shut down the database instance by using Cloud Control.

Step	Window/Page Description	Choices or Values
a.	Cloud Control (See screenshot 3a below)	Select Oracle Database > Control > Startup/Shutdown
b.	Startup/Shutdown:Specify Host and Target Database Credentials (See screenshot 3b below)	Host Credentials: Credential: Select New . Username: oracle Password: <os password> Save As: ORCL_HOST Confirm password: oracle Select Set As Preferred Credentials. Select Database Host Credentials. Click Test.
c.	Startup/Shutdown:Specify Host and Target Database Credentials	Response: Test successful
d.	Startup/Shutdown:Specify Host and Target Database Credentials	Database Credentials: Credential: Select New

Step	Window/Page Description	Choices or Values
		Username: SYS (<i>this must be uppercase</i>) Password: oracle_4U Save As: ORCL_SYSDBA Confirm password : oracle_4U Role: SYSDBA Select Set As Preferred Credentials. Select SYSDBA Database Credentials. Click Test.
e.	Startup/Shutdown:Specify Host and Target Database Credentials	Response: Test Successful Click OK.
f.	Startup/Shutdown:Confirmation	Click Advanced Options.
g.	Startup/Shutdown:Advanced Shutdown Options	Examine the options. Notice that the mode for shutting down is Immediate. Do not change the mode; it should remain as "Immediate." Click Cancel.
h.	Startup/Shutdown:Confirmation	Click Yes.
i.	Startup/Shutdown:Activity Information	Wait for next page to be displayed.
j.	orcl home page is displayed (see screenshot 3j below)	Note that the status of the instance is now "Down."

3a.



3b.

Startup/Shutdown:Specify Host and Target Database Credentials

Specify the following credentials in order to change the status of the database.

Host Credentials

Specify the OS user name and password to login to target database machine.

Select Credential

Select credential from one of the following options.

Credential	<input type="radio"/> Preferred	<input type="radio"/> Named	<input checked="" type="radio"/> New
* UserName	oracle		
* Password	*****		
* Confirm Password	*****		
<input checked="" type="checkbox"/> Save As ORCL_HOST			
<input checked="" type="checkbox"/> Set As Preferred Credentials Database Host Credentials ▾			
Test			

Database Credentials

Specify the credentials for the target database.

To use OS authentication, leave the user name and password fields blank.

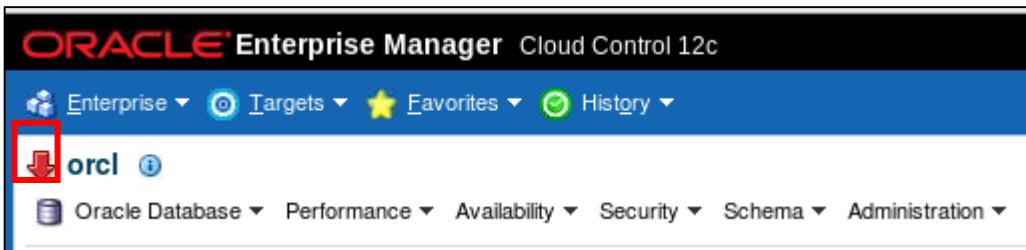
Select Credential

Select credential from one of the following options.

Credential	<input type="radio"/> Preferred	<input type="radio"/> Named	<input checked="" type="radio"/> New
* Username	SYS		
* Password	*****		
* Confirm Password	*****		
Role	SYSDBA ▾		
<input checked="" type="checkbox"/> Save As ORCL_SYSDBA			
<input checked="" type="checkbox"/> Set As Preferred Credentials SYSDBA Database Credentials ▾			
Test Test Successful.			

Note Note that you need to login to the database as SYSDBA or SYSOPER in order to change the status of the database.

3c.



- Using SQL*Plus, verify that you are *not* able to connect as the HR user to a database that has been shut down.

- a. In the Linux command window, set your environment to the `orcl` database by using `oraenv`.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

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

```
$ sqlplus hr
```

- c. Enter `oracle_4U` for the password.

Note the ORACLE not available error message.

```
$ sqlplus hr
```

```
SQL*Plus: Release 12.1.0.2.0 Production on Wed Oct 8 07:22:47
2014
```

```
Copyright (c) 1982, 2014, Oracle. All rights reserved.
```

```
Enter password:
```

```
ERROR:
```

```
ORA-01034: ORACLE not available
```

```
ORA-27101: shared memory realm does not exist
```

```
Linux-x86_64 Error: 2: No such file or directory
```

```
Additional information: 3640
```

```
Additional information: 1371676159
```

```
Process ID: 0
```

```
Session ID: 0 Serial number: 0
```

```
Enter user-name:
```

- d. Press **Ctrl + D** to exit the username prompt.
5. Use Cloud Control to restart the database instance.
 - a. In Cloud Control, navigate to the Startup/Shutdown page by selecting **Oracle Database > Control > Startup/Shutdown**.
 - b. In Host Credentials, select Credential: Named. Select **ORCL_HOST**.
 - c. In Database Credentials, select Credential: Named. Select **ORCL_SYS**. Click **OK**.
 - d. On the Confirmation Page, click **Advanced Options** to see the modes and options available for starting up, but do not change the startup options.
 - e. Click **Cancel** to return to the previous page. Click **Yes**.
 - f. The Startup/Shutdown:Activity Information is displayed. Wait for the next page. The `orcl` home page appears.

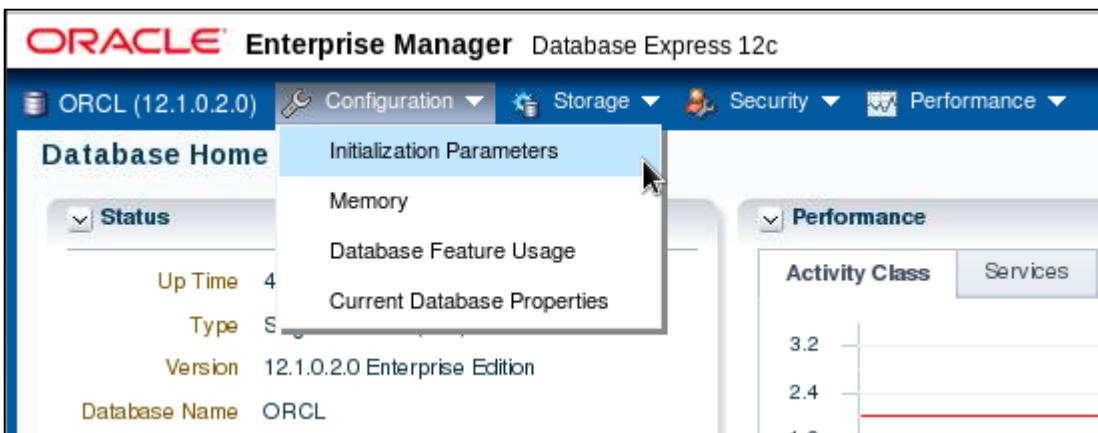
Practice 4-2: Managing the Oracle Instance by Using Oracle Enterprise Manager Database Express

Overview

In this practice, you use Oracle Enterprise Manager Database Express (EM Express) to view and change database instance parameters.

Tasks

1. Invoke EM Express and log in as the DBA1 user.
 - a. Click the **Firefox Web Browser** icon on your desktop to open your web browser as the oracle user.
 - b. Enter the following URL: <http://localhost:5500/em>.
 - c. In the Oracle Enterprise Manager Database Express login page, enter **DBA1** as the User Name, enter **oracle_4U** as the Password, and select **as sysdba**. 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?
 - a. On the ORCL database home page, select **Configuration > Initialization Parameters**.



- b. Enter **job** in the Search field.

- c. When the JOB_QUEUE_PROCESSES initialization parameter appears, select it and click Set.

The dialog box is titled "Initialization Parameters". It has two tabs: "Current" (selected) and "SPFile". Below the tabs, a message says: "The parameter values listed here are currently used by the running instance(s)". There are three buttons at the top: "View", "Set..." (which is highlighted with a red box), and "Help". A table below shows parameters under the "Scheduler" group. The row for "job_queue_processes" has a value of "1000".

Name	Value
<input checked="" type="checkbox"/> Scheduler	
job_queue_processes	1000

- d. In the dialog box, change the value to **15**.
e. Click **Show SQL** and note the SQL statement that is going to be executed.

The dialog box is titled "Confirmation". It says "SQL statement successfully generated". Below that, there is a "SQL" dropdown menu showing the generated SQL command: "alter system set \"job_queue_processes\"=15 scope=both sid='*';". At the bottom right is an "OK" button.

- f. Click **OK** on the Confirmation page, and then click **OK** on the Set Initialization Parameter page.
g. Click **OK** on the Confirmation page.
h. Log out of EM Express.

Question: What is the significance of a check in the Dynamic column?

Answer: A “dynamic” parameter can be modified while the database is running.

Practice 4-3: Managing the Oracle Instance by Using SQL*Plus

Overview

In this practice, you use SQL*Plus to view and change instance parameters.

Tasks

1. Set the JOB_QUEUE_PROCESSES initialization parameter to 1000 by using SQL*Plus.
 - a. In the Linux command window set your environment to the orcl database by using oraenv.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

- b. Enter the following to log in to the database:

```
$ sqlplus / as sysdba
```

Question: When can you connect to the database instance without a password?

Answer: You can connect to the database without a password when you have a local connection (on the same machine) and the OS user is a member of the privileged OSDBA group. On this machine, the OSDBA group is the dba group.

- c. View the current setting of the JOB_QUEUE_PROCESSES parameter.

```
SQL> SHOW PARAMETER job

NAME                           TYPE        VALUE
-----
job_queue_processes            integer     15
```

- d. Change the JOB_QUEUE_PROCESSES initialization parameter to 1000 in both the current instance (MEMORY) and the server parameter file (SPFILE).

```
SQL> ALTER SYSTEM SET job_queue_processes=1000 SCOPE=BOTH;

System altered.
```

- e. View the changed parameter.

```
SQL> SHOW PARAMETER job

NAME                           TYPE        VALUE
-----
job_queue_processes            integer     1000
```

2. Using SQL*Plus, shut down and restart the `orcl` database instance.
- In SQL*Plus, shut down the database instance.

```
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
```

- Start the database instance.

```
SQL> startup
ORACLE instance started.

Total System Global Area  503316480 bytes
Fixed Size                  2926080 bytes
Variable Size                268438016 bytes
Database Buffers            226492416 bytes
Redo Buffers                 5459968 bytes
Database mounted.
Database opened.
```

3. 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 500M

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>
```

4. Check the value of `JOB_QUEUE_PROCESSES`.

```
SQL> show parameter job_queue_processes
```

NAME	TYPE	VALUE
job_queue_processes	integer	1000

5. Exit from SQL*Plus.

Practice 4-4: Viewing the Alert Log by Using the Automatic Diagnostic Repository Command Interface (ADRCI)

Overview

In this practice, you use command-line tools to view the `orcl` instance alert log and find the startup phases.

Tasks

1. In the alert log, view the phases that the database went through during startup. What are they?

Use ADRCI to view the alert log. **Select the option for the `diag/rdbms/orcl/orcl` directory.**

Note: The list of home directories may vary from what is shown in the code box below.

```
$ adrci  
...  
ADR base = "/u01/app/oracle"  
adrci> show alert
```

Choose the home from which to view the alert log:

```
1: diag/rdbms/em12rep/em12rep  
2: diag/rdbms/orcl/orcl  
3: diag/tnslsnr/EDRSR32P1/listener  
Q: to quit
```

Please select option: 2

Note: This opens the alert file using the `vi` editor by default

2. Scroll through the log and review the phases of the database during startup. Use the `vi` search commands to find the appropriate lines. Your alert log may differ from what is shown in this practice.
 - a. Enter `G` to move to bottom of the file.
 - b. Enter the string: `?Starting ORACLE instance? [CR]` to search from the bottom of the file to find the last time the instance was started. The following will be similar to your alert log. **Note:** Case is significant in the search command.

```
2012-10-31 08:43:37.541000 +00:00  
WARNING: failed to retrieve DB spfile location (unable to  
communicate with CRSD/OHASD)  
Starting ORACLE instance (normal)  
CLI notifier numLatches:3 maxDescs:519  
***** Large Pages Information *****  
Per process system memlock (soft) limit = 64 KB
```

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```
Total System Global Area in large pages = 0 KB (0%)  
  
Large pages used by this instance: 0 (0 KB)  
Large pages unused system wide = 0 (0 KB)  
Large pages configured system wide = 0 (0 KB)  
Large page size = 2048 KB
```

- c. Scroll down and find the line that starts with ALTER DATABASE MOUNT.
- d. Scroll down and find the line that starts with ALTER DATABASE OPEN.
- e. Notice that the modes that the database goes through during startup are MOUNT and OPEN.
- f. Exit vi by entering :q. Exit ADRCI by entering Q, and then exit.

```
Choose the home from which to view the alert log:
```

```
1: diag/rdbms/em12rep/em12rep  
2: diag/rdbms/orcl/orcl  
3: diag/tnslsnr/EDRSR32P1/listener  
Q: to quit
```

```
Please select option: 2  
Output the results to file: /tmp/alert_5717_14002_orcl_1.ado
```

```
Please select option: Q  
adrci> exit  
$
```


Practices for Lesson 5: Configuring the Oracle Network Environment

Chapter 5

Practices for Lesson 5: Overview

Practices Overview

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.

Note: This practice is entirely for educational purposes and no future practices rely on successful completion of this practice.

Practice 5-1: 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 by 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/12.1.0/dbhome_1 is
/u01/app/oracle
```

- b. Change the directory to `$ORACLE_HOME/network/admin` and then list your current working directory.

```
$ cd $ORACLE_HOME/network/admin
$ pwd
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin
```

- c. Copy the `tnsnames.ora` file to `tnsnames.old`.

```
$ cp tnsnames.ora tnsnames.old
```

- d. Enter `ls -l`, if you want to see the copy and its privileges in your directory.

2. Use Oracle Net Manager (`netmgr`) to create the `testorcl` net service name on your machine.

Step	Window/Page Description	Choices or Values
a.	Terminal as oracle user	<code>\$ netmgr</code>
b.	Net Manager navigation pane	Expand Local .
c.		Select Service Naming .
d.		Expand Service Naming .
e.		Click the green plus sign to launch the net service name wizard.
f.	Net Service Name Wizard: Welcome	Enter Service Name: testorcl Click Next .
g.	Net Service Name Wizard:...Protocol	Select TCP/IP (Internet Protocol) . Click Next .
h.	Net Service Name Wizard:...Protocol Settings	Enter Host Name: <assigned hostname or IP address> Enter Port Number: 1521 Click Next .

Step	Window/Page Description	Choices or Values
i.	Net Service Name Wizard:...Service	Enter Service: orcl Click Next .
j.	Net Service Name Wizard:...Test	Click Test .
k.	Connection Test	Connection Test was successful Click Close .
l.	Net Service Name Wizard:...Test	Click Finish .
m.	Oracle Net Manager	Click File > Save Network Configuration Click File > Exit

3. Test your changes to the network configuration by using SQL*Plus. Enter **system@testorcl** and then enter **oracle_4U** when prompted for the password. Select the **INSTANCE_NAME** and **HOST_NAME** columns from the **V\$INSTANCE** view to view information about the host.

- a. Ensure your environment is set for the **orcl** database by executing the **oraenv** command.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
```

- b. In your terminal window, enter:

```
$ sqlplus system@testorcl

Enter password: oracle_4U Note password is not displayed

SQL>
```

If you receive any errors or warnings, resolve them.

- c. At the **SQL>** prompt, enter the following command, and then exit from SQL*Plus:

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

INSTANCE_NAME      HOST_NAME
-----
orcl              <assigned_hostname>
SQL> exit
```

Practice 5-2: Creating an Alternative Listener

In this practice, you create a second listener named LISTENER2 by using Oracle Net Manager.

- Create a new listener called LISTENER2. Use port 1561 for this listener. Use Oracle Net Manager (netmgr) to create the new listener.

Step	Window/Page Description	Choices or Values
a.	Terminal as oracle user	\$ netmgr
b.	Oracle Net Manager navigation pane	Expand Local . Select Listeners . Expand Listeners . Click the green plus sign  to begin defining a new listener.
c.	Choose Listener Name	Enter LISTENER2 . Click OK .
d.	Oracle Net Manager: (right pane)	Click Add Address .
e.	Oracle Net Manager: Address1	Enter Port Number: 1561
f.	Oracle Net Manager	Click File > Save Network Configuration

- Create a Service Name for both listeners by using Oracle Net Manager

Step	Window/Page Description	Choices or Values
a.	Oracle Net Manager	Enter netmgr if necessary.
b.	Oracle Net Manager navigation pane	Select Service Naming . Expand Service Naming . Click the green plus sign  to launch the Net Service Name Wizard.
c.	Net Service Name Wizard: Welcome	Enter Service Name: Listener1 Click Next .
d.	Net Service Name Wizard:...Protocol	Select TCP/IP (Internet Protocol) Click Next .
e.	Net Service Name Wizard:...Protocol Settings	Enter Host Name: localhost Enter Port Number: 1521 Click Next .
f.	Net Service Name Wizard:...Service	Enter Service: orcl Click Next .
g.	Net Service Name Wizard:...Test	Click Finish .
h.	Oracle Net Manager navigation pane	Select Service Naming . Expand Service Naming .

Step	Window/Page Description	Choices or Values
		Click the green plus sign  to launch the Net Service Name Wizard.
i.	Net Service Name Wizard: Welcome	Enter Service Name: Listener2 Click Next .
j.	Net Service Name Wizard:...Protocol	Select TCP/IP (Internet Protocol) . Click Next .
k.	Net Service Name Wizard:...Protocol Settings	Enter Host Name: localhost Enter Port Number: 1561 Click Next .
l.	Net Service Name Wizard:...Service	Enter Service: orcl Click Next .
m.	Net Service Name Wizard:...Test	Click Finish .
n.	Oracle Net Manager	Click File > Save Network Configuration Click File > Exit .

3. Start the **LISTENER2** listener by using the listener control utility.

```
$ lsnrctl start listener2
LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 08-OCT-
2014 10:56:22

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Starting /u01/app/oracle/product/12.1.0/dbhome_1/bin/tnslsnr:
please wait...

TNSLSNR for Linux: Version 12.1.0.2.0 - Production
System parameter file is
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.o
ra
Log messages written to
/u01/app/oracle/diag/tnslsnr/EDRSR9P1/listener2/alert/log.xml
Listening on:
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edRSR9P1.us.oracle.com)
(PORT=1561)))

Connecting to
(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=EDRSR9P1)(PORT=1561)))
STATUS of the LISTENER
-----
Alias          listener2
```

```

Version                                TNSLSNR for Linux: Version 12.1.0.2.0
- Production

Start Date                            08-OCT-2014 10:56:24
Uptime                                 0 days 0 hr. 0 min. 2 sec
Trace Level                            off
Security                               ON: Local OS Authentication
SNMP                                    OFF

Listener Parameter File
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.ora

Listener Log File
/u01/app/oracle/diag/tnslsnr/EDRSR9P1/listener2/alert/log.xml

Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edRSr9p1.us.oracle.com)(PORT=1561)))
The listener supports no services
The command completed successfully

```

4. Configure the database to register with both listeners. Alter the LOCAL_LISTENER initialization parameter.
 - a. Start SQL*Plus in a terminal window. Be sure to set the Oracle environment to `orcl` by using `oraenv` if you have started a new terminal window. Connect as the `SYS` user AS SYSDBA.
 - b. In SQL*Plus, view and set the LOCAL_LISTENER initialization parameter to include both listeners. Then exit SQL*Plus.

```

SQL> show parameter local_listener

NAME                           TYPE        VALUE
-----
local_listener                 string

SQL> ALTER SYSTEM SET LOCAL_LISTENER=LISTENER1,LISTENER2
SCOPE=BOTH;

System altered.

SQL> show parameter local_listener

NAME                           TYPE        VALUE
-----
local_listener                 string     LISTENER1, LISTENER2
SQL>

SQL> exit

```

5. Check the status of the new listener and test the new listener.

- a. In a terminal window with the Oracle environment properly set, issue the following commands at the command prompt:

```
$ lsnrctl status LISTENER2
...
Connecting to
(DESCRIPTION= (ADDRESS= (PROTOCOL=TCP) (HOST=EDRSR9P1) (PORT=1561)))
STATUS of the LISTENER
-----
Alias                      listener2
Version                    TNSLSNR for Linux: Version 12.1.0.2.0
- Production
Start Date                 08-OCT-2014 10:56:24
Uptime                     0 days 0 hr. 5 min. 34 sec
Trace Level                off
Security                   ON: Local OS Authentication
SNMP                       OFF
Listener Parameter File    /u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.ora
Listener Log File          /u01/app/oracle/diag/tnslsnr/EDRSR9P1/listener2/alert/log.xml
Listening Endpoints Summary...
                               ...
(DESCRIPTION= (ADDRESS= (PROTOCOL=tcp) (HOST=edRSr9p1.us.oracle.com)
(PORT=1561)))

(DESCRIPTION= (ADDRESS= (PROTOCOL=tcp) (HOST=edRSr9p1.us.oracle.com)
(PORT=5500)) (Presentation=HTTP) (Session=RAW))
Services Summary...
Service "orcl" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "orclXDB" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
The command completed successfully
```

- b. Connect to your database using the new listener by using an easy connect string.

Note: This method of connecting is not a recommended approach for a production environment. It is being used in the classroom environment just to prove that the newly created listener works.

```
$ sqlplus hr/oracle_4U@localhost:1561/orcl
...
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real
Application Testing options

SQL> exit
```

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

6. You can now stop the new LISTENER2 listener because you do not need it for the remainder of the course.

```
$ lsnrctl stop LISTENER2
LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 08-OCT-
2014 11:19:57

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Connecting to
(DESCRIPTION= (ADDRESS= (PROTOCOL=TCP) (HOST=EDRSR9P1) (PORT=1561)))
The command completed successfully
```

7. Reset the LOCAL_LISTENER initialization parameter to the default value.

- Log in to SQL*Plus as the DBA1 user with the AS SYSDBA option.
- Execute the ALTER SYSTEM RESET LOCAL_LISTENER command to reset the initialization parameter to the default value.

```
SQL> alter system reset local_listener scope=spfile;
System altered.
```

- Shut down the database instance with the IMMEDIATE option.

```
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
```

- d. Restart the database instance and exit from SQL*Plus.

```
SQL> startup
ORACLE instance started.

...
Database mounted.

Database opened.

SQL> exit
```

Practices for Lesson 6: Administering User Security

Chapter 6

Practices for Lesson 6: Overview

Practices Overview

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, all the `HR` schema tables. The manager also needs to be able to insert and delete new `HR` 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 6-1: Creating a User and 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:** Create the `INVENTORY` user with a password of `oracle_4U`.

In a terminal window enter:

```
$ sqlplus DBA1/oracle_4U as sysdba
...
Connected to:
...
SQL> create user inventory identified by oracle_4U
2>   default tablespace users
3>   quota unlimited on users;

User created.

SQL> grant connect to inventory;

Grant succeeded.

SQL> exit

Disconnected ...
$
```

2. Create a profile named `HRPROFILE` that allows only 15 minutes idle time.

Invoke Enterprise Manager Database Express. Log in as the `DBA1` user with the `SYSDBA` role. Then execute the following steps:

Step	Window/Page Description	Choices or Values
a.	EM Express	Select Security > Profiles
b.	Profiles	Select Create Profile .
c.	Create Profile Dialog: New Profile	Enter <code>HRPROFILE</code> in the Name field. Click the Next icon  .
d.	Create Profile Dialog: General	Select 15 in the Idle Time (Minutes) menu. Leave all the other fields set to the default value of Unlimited. Click the Next icon  .
e.	Create Profile Dialog: Password	Review the Password options. All should be set to default values of Unlimited or Null. Click Show SQL to review the SQL command for this task.

Step	Window/Page Description	Choices or Values
f.	Confirmation	Click OK .
g.	Create Profile Dialog: Password	Click OK .
h.	Confirmation	Click OK .

3. Set the **RESOURCE_LIMIT** initialization parameter to **TRUE** so that your profile limits are enforced.

Step	Window/Page Description	Choices or Values
a.		Select Configuration > Initialization Parameters
b.	Initialization Parameters	Enter resource_limit in the Name field.
c.	Initialization Parameters	Confirm that resource_limit is set to true . If it is not set to true, perform steps d-f.
d.	Initialization Parameters	Select resource_limit Click Set .
e.	Set Initialization Parameter	Set Value true . Click OK .
f.	Confirmation	Click OK .

Practice 6-2: 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 all the **HR** schema tables.

Step	Window/Page Description	Choices or Values
a.	EM Express	Select Security > Roles .
b.	Roles	Click Create Role .
c.	Create Role: New Role	Enter HRCLERK as Role Name. Click the Next icon.
d.	Create Role: Privilege	Click Show SQL .
e.	Confirmation	Verify the SQL command: <code>create role "HRCLERK" NOT IDENTIFIED</code> Click OK .
f.	Create Role: Privilege	Click OK .
g.	Confirmation	Click OK .
h.	Roles	Select HRCLERK . Select Actions > Grant Object Privileges .
i.	Grant Object Privileges Select Schema and Object Type	Set Schema to HR . Set Object Type to Table . Click the Next icon.
j.	Grant Object Privileges: Select Objects	Select all tables on left (click and shift-click) and move to Selected Objects. Click the Next icon.
k.	Grant Object Privileges: Grant Object Privileges	Check Select . Check Update . Click Show SQL .
l.	Confirmation	Verify the SQL for each table: (EMPLOYEES table shown as an example) <code>GRANT SELECT ON "HR"."EMPLOYEES" TO "HRCLERK"</code> <code>GRANT UPDATE ON "HR"."EMPLOYEES" TO "HRCLERK"</code> Click OK .
m.	Grant Object Privileges: Grant Object Privileges	Click OK .
n.	Confirmation	Click OK .

2. Create the role named **HRMANAGER** with **INSERT** and **DELETE** permissions on all the **HR** tables. Grant the **HRCLERK** role to the **HRMANAGER** role.

Step	Window/Page Description	Choices or Values
a.	EM Express	Select Security > Roles
b.	Roles	Click Create Role .
c.	Create Role: New Role	Enter HRMANAGER as Role Name. Click the Next icon.
d.	Create Role: Privilege	Enter HR in the search box. Select HRCLERK and move it to the right-hand pane. Click OK .
e.	Confirmation	Click OK .
f.	Roles	Select HRMANAGER . Click Actions > Grant Object Privileges
g.	Grant Object Privileges Select Schema and Object Type	Set Schema to HR . Set Object Type to Table . Click the Next icon.
h.	Grant Object Privileges: Select Objects	Select all tables and move to Selected Objects Click the Next icon.
i.	Grant Object Privileges: Grant Object Privileges	Check Delete . Check Insert . Click Show SQL .
j.	Confirmation	Verify the SQL: (EMPLOYEES is shown as an example) grant INSERT on "HR"."EMPLOYEES" to "HRMANAGER" grant DELETE on "HR"."EMPLOYEES" to "HRMANAGER" Click OK .
k.	Grant Object Privileges: Grant Object Privileges	Click OK .
l.	Confirmation	Click OK .

Practice 6-3: 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

- Create an account for David Hamby, a new HR clerk.

Step	Window/Page Description	Choices or Values
a.	EM Express	Select Security > Users
b.	Users	Click Create User .
c.	Create User: User Account	Name: DHAMBY Authentication: Select Password Password: newuser Profile: HRPROFILE Select Password expired Click the Next icon. Note: This user will have to change the password.
d.	Create User: Tablespace	Verify Default Tablespace: USERS Temporary Tablespace: TEMP Click the Next icon.
e.	Create User: Privilege	Select Connect and move it to the right pane. Click Show SQL .
f.	Confirmation	Click OK .
g.	Create User: Privilege	Select HRCLERK and move it to the right pane. Hint: Enter HR in the search/filter box. Click Show SQL .
h.	Confirmation	Copy and paste the SQL statements into a gedit window.
i.	Linux Desktop (see screenshot below)	Click Applications > Accessories > gedit Text Editor In gedit, click File > Save as Enter P6script.sql as the file name. Save in the default location of /home/oracle . Click Save . Click File > Quit

Step	Window/Page Description	Choices or Values
j.	Confirmation	Click OK .
k.	Create User: Privilege	Click OK .
l.	Confirmation	Click OK .



2. Create an account for Rachel Pandya, another new HR clerk. Modify the `P6script.sql` script to create the RPANDYA user.
- Open the `/home/oracle/P6script.sql` file in an editor (instructions assume you are using gedit).
 - Substitute `RPANDYA` for `DHAMBY` in every occurrence of `DHAMBY`.
 - Specify the password as `newuser`.
 - Check the script for SQL end-of-command delimiters “;” (semicolon). Add semicolons as necessary for correct syntax.
 - Add an `exit` command to the end of the file.
 - Save and close the file.
 - In a terminal window, execute the `P6script.sql` script in SQL*Plus as the `DBA1` user with the `SYSDBA` role connected to the `orcl` database.

```
$ sqlplus dba1/oracle_4U as sysdba @/home/oracle/P6script.sql
```

...

Connected to:

...

User created.

Grant succeeded.

Grant succeeded.

```
Disconnected
...
$
```

- h. Use EM Express to check that user RPANDYA has been created as expected.

Hint: You may have to refresh EM Express to see the RPANDYA user.

View User: RPANDYA

Account Summary	
Name	RPANDYA
Profile	HRRPROFILE
Authentication	PASSWORD
Expiration Date	Thu Jan 10, 2013 9:46:38 AM
Default Tablespace	USERS
Temporary Tablespace	TEMP
Account Status	EXPIRED
Created	Thu Jan 10, 2013 9:46:38 AM

Details								
Privileges & Roles	Object Privileges	Quotas						
<input type="button" value="Edit"/> <input type="button" value="Revoke"/> <table border="1"> <thead> <tr> <th>Privilege</th> <th></th> </tr> </thead> <tbody> <tr> <td>CONNECT</td> <td></td> </tr> <tr> <td>HRCLERK</td> <td></td> </tr> </tbody> </table>	Privilege		CONNECT		HRCLERK			
Privilege								
CONNECT								
HRCLERK								

3. Create an account for Jenny Goodman, the new HR manager. Modify the P6script.sql script to take parameters for the username and role. Execute the script to create the JGOODMAN user with the HRMANAGER role.
- In gedit or an editor of your choice, open the script /home/oracle/P6script.sql.
 - Change every occurrence of RPANDYA to &&username.
 - Change every occurrence of HRCLERK to &&role.
 - Save and close the file.
 - Execute the SQL script in SQL*Plus as the DBA1 user with the SYSDBA role connected to the orcl database instance.

```
$ sqlplus dba1/oracle_4U as sysdba @/home/oracle/P6script.sql
...
Connected to:
```

```

...
Enter value for username: JGOODMAN
old  1: create user "&&username" identified by newuser profile
"HRPROFILE" password expire account unlock default tablespace
"USERS" temporary tablespace "TEMP"
new  1: create user "JGOODMAN" identified by newuser profile
"HRPROFILE" password expire account unlock default tablespace
"USERS" temporary tablespace "TEMP"

User created.

Enter value for role: HRMANAGER
old  1: grant &&role to &&username
new  1: grant HRMANAGER to JGOODMAN

Grant succeeded.

old  1: grant "CONNECT" to &&username
new  1: grant "CONNECT" to JGOODMAN

Grant succeeded.

Disconnected ...

$
```

Note: The double ampersand && indicates to SQL*Plus to keep the value of this variable and use the same value each time it sees this variable. If you had used a single ampersand &, SQL*Plus would have prompted you to enter the value each time the substitution variable occurred in the script.

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
ORACLE_SID = [oracle] ? orcl
...
$ sqlplus dhamby
```

Or, if you already have a SQL*Plus session started, use the `CONNECT` command. If you reconnect as `dhamby` in SQL*Plus, the login and change-of-password session look like this:

```
SQL> CONNECT dhamby
```

In either case, the next line will be a prompt for the password.

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

- b. Change the password to oracle_4U.

```
Changing password for dhamby
New password: oracle_4U    <<<Password does not appear
Retype new password: oracle_4U    <<<Password does not appear
Password changed
...
Connected to:
...
SQL>
```

- c. Select the salary for employee 197 from the HR.EMPLOYEES table.

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

      SALARY
-----
      3000
```

- d. Now attempt to delete the same row 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
Changing password for jgoodman
New password: *****
Retype new password: *****
Password changed
Connected.
SQL>
```

- b. Select the row for employee 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: 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: CREATE SESSION is one of the privileges of the CONNECT 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. HRPROFILE 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.

```
SQL> SELECT salary FROM hr.employees WHERE EMPLOYEE_ID=197;
ERROR at line 1:
ORA-02396: exceeded maximum idle time, please connect again
```

Practices for Lesson 7: Managing Database Storage Structures

Chapter 7

Practices for Lesson 7: Overview

Practices Overview

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.

Practice 7-1: Viewing Database Storage Structure Information

In this practice, you examine existing storage structure information for your database.

Assumptions: The `lab_03_03_01.sh` script has already been executed to create a user named `DBA1` in the database. This user has `SYSDBA` privileges.

1. Launch Enterprise Manager Cloud Control and log in as `ADMIN`.
2. Navigate to the `orcl` Database Home page.
 - a. Navigate to your target database: **Targets > Databases**.
 - b. Select the Search List radio button at the top of the page.
 - c. On the Databases page, click `orcl`.

The screenshot shows the 'Databases' page in Oracle Enterprise Manager Cloud Control. At the top, there are tabs for Performance, Availability, Security, and Schema. Below that, a search bar is set to 'Search List'. A toolbar includes View, Add, Remove, and Configure buttons. The main table lists databases with columns for Name, Type, Status, Target Version, and Incidents. The 'orcl' database is selected and highlighted in yellow. Its details are shown in a tooltip: Name: orcl, Type: Database Instance, Status: Up (green), Target Version: 12.1.0.2.0, Incidents: 0. The status bar at the bottom right indicates the page was refreshed on Oct 9, 2014, at 9:59:52 AM.

3. The `orcl` Database Home page appears.
4. Using Cloud Control, view information about the `EXAMPLE` tablespace and answer the given questions.

Step	Window/Page Description	Choices or Values
a.	Database home page	Select Administration > Storage > Tablespaces .
b.	Database Login page (see image below)	Username: <code>dba1</code> Password: <code>oracle_4U</code> Role: <code>SYSDBA</code> Select Save As . Select Set as Preferred Credentials . Select SYSDBA Database Credentials . Click Login .

Database Login

* Username	dba1
* Password	*****
Role	SYSDBA ▾
<input checked="" type="checkbox"/> Save As NC_ORCL_2014-10-09-100609	
<input checked="" type="checkbox"/> Set As Preferred Credentials SYSDBA Database Credentials ▾	
<input type="button" value="Login"/> <input type="button" value="Cancel"/>	

Question 1: The `EXAMPLE` tablespace is nearly full. Can the tablespace size increase without you having to take any action?

Step	Window/Page Description	Choices or Values
c.	Tablespaces	Click the <code>EXAMPLE</code> tablespace name. At the bottom of the page, view the Datafiles section.

Answer: Yes. The `example01.dbf` datafile is configured to auto extend.

Datafiles					
Name	Directory	Size (MB)	Used (MB)	Maximum File Size (MB)	Auto Extend
example01.dbf	/u01/app/oracle/oradata/orcl/	1,243.75	1,219.06	32,767.00	Yes

Question 2: How many segments are there in the `EXAMPLE` tablespace?

Step	Window/Page Description	Choices or Values
a.	View Tablespace: EXAMPLE	From the Actions drop-down list, select Show Tablespace Contents . Click Go .
b.	Show Tablespace Contents	View the number of rows displayed; this is the number of objects in the tablespace.

Answer: 351 (Your answer may vary.)

Tablespaces > View Tablespace: EXAMPLE > Show Tablespace Contents

Show Tablespace Contents

Size (MB)	Used (MB)	Extent Mgmt	Auto Extend
1243.8	1219.1	LOCAL Segment Mgmt AUTO	Yes Extents 1453
Block Size (KB)	Used (%)		
8	98.0		

Segments

Search

Segment Name Type Minimum Size (KB)

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.

Segment Name	Type	Size (KB)	Extents
SH.CUSTOMERS	TABLE	13,312	28

Previous [1-10 of 351] Next 10

Question 3: Which index in the EXAMPLE tablespace takes up the most space?

Step	Window/Page Description	Choices or Values
a.	Show Tablespace Contents	Under Segments, select INDEX in the Type drop-down list. Click Go.
b.	Show Tablespace Contents	Notice that the Size column is the sort column and that the rows are sorted in descending order.

Previous [1-10 of 90] Next 10

Segment Name	Type	Size (KB)	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

Answer: SH.CUSTOMERS_PK

Practice 7-2: Creating a Tablespace

In this practice, you create a script to create the `INVENTORY` tablespace that will be used in a later practice.

- Create a new locally managed tablespace (LMT) called `INVENTORY` of size 5 MB.

Step	Window/Page Description	Choices or Values
a.	Show Tablespace Contents	Navigate to the Tablespace page by clicking Tablespaces in the locator link at the top of the page.
b.	Tablespaces	On the right side of the page, click Create .
c.	Create Tablespace	Tablespace Name: INVENTORY Extent Management is Locally Managed . Type is Permanent . Status is Read Write . In the Datafiles region: Verify “Use bigfile tablespace” is <u>not</u> selected. Click Add .

Tablespaces > Create Tablespace
Create Tablespace

Logged in as DBA1

Execute On Multiple Databases Show SQL Cancel OK

General Storage Automatic Data Optimization In-Memory Columnar

* Name

Extent Management

Locally Managed
 Dictionary Managed

Type

Permanent
 Set as default permanent tablespace
 Encryption [Encryption Options](#)
 Temporary
 Set as default temporary tablespace
 Undo

Status

Read Write
 Read Only
 Offline

Datafiles

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

Select	Name	Directory	Size (MB)	Maximum File Size (MB)
	No items found			Add

Step	Window/Page Description	Choices or Values
d.	Add Datafile	Filename: inventory01.dbf File Size: 5 MB Click Continue .

Tablespaces > Add Datafile

Add Datafile

* File Name

* File Directory 

Tablespace **INVENTORY**

File Size MB

Reuse Existing File

Storage

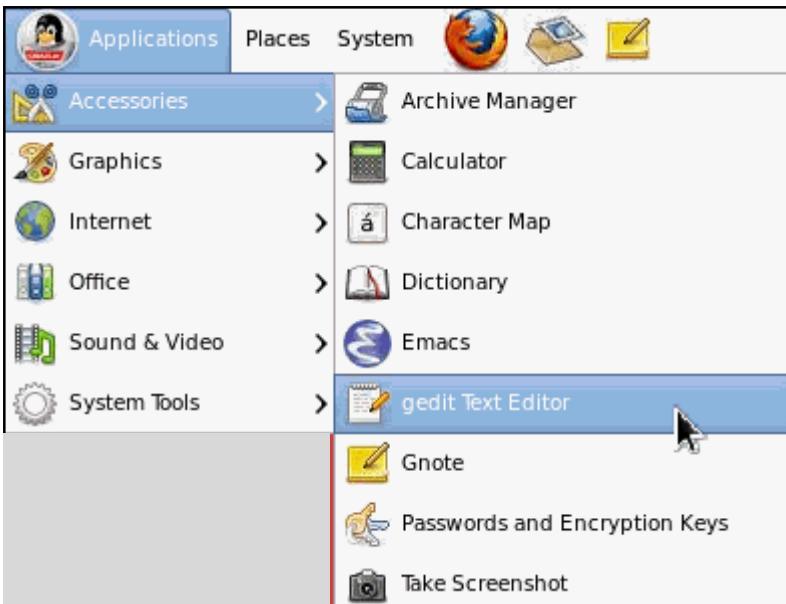
Automatically extend datafile when full (AUTOEXTEND)

Increment MB

Maximum File Size Unlimited
 Value MB

 **TIP** Changes made on this page will NOT take effect until you click "OK" button on the Tablespace page.

Step	Window/Page Description	Choices or Values
e.	Create Tablespace: General tab	Click Storage tab.
f.	Create Tablespace: Storage tab	Verify Extent Allocation: Automatic Segment Space Management: Automatic Compression Options: No Compression Enable Logging: Yes Click General tab.
g.	Create Tablespace: General tab	Click Show SQL .
h.	Linux Desktop	Open a gedit editor window. Click Applications > Accessories > gedit Text Editor



Step	Window/Page Description	Choices or Values
a.	Show SQL	Select the text of the SQL statement. Copy the text.
b.	gedit	Paste the SQL statement into the window.
c.	Show SQL	Click Return .
d.	Create Tablespace	Click Cancel .
e.	gedit	Review the SQL command. Edit it if necessary. Be sure it ends with a semicolon (;).
f.	gedit	Click File > Save as .
g.	Save As ...	Enter Name: P7script.sql Folder: oracle Click Save .
h.	gedit	Click File > Quit .

2. Execute the `P7script.sql` script you just created.
 - a. In a terminal window, change the directory to `~oracle`.
 - b. Set the Oracle environment for the `orcl` database.
 - c. Run the `P7script.sql` script as the `DBA1` user with password of `oracle_4U`.

```
$ cd ~oracle
$ . oraenv
ORACLE_SID = [oracle] ? orcl
```

```
The Oracle base for  
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is  
/u01/app/oracle  
$ sqlplus DBA1 @P7script.sql  
...  
Enter password:*****  
...  
Connected to:  
...  
Tablespace created.  
  
SQL> exit
```

3. As the **DBA1** user, run the **lab_07_02_03.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/P7** directory.

```
$ cd $LABS/P7
```

- b. Log in to SQL*Plus as the **dba1** user (with a password of **oracle_4U**) and run the **lab_07_02_03.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  
...  
Enter password:*****  
  
Connected to:  
...  
SQL> @lab_07_02_03.sql
```

- c. Note that there is eventually an **ORA-01653** error indicating 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 ...
```

4. In Cloud Control, go to the Tablespaces page for the `orcl` database and increase the amount of space available for the `INVENTORY` tablespace. For educational purposes, you will accomplish this by using two different methods. First, increase the size of the current data file to **40 MB**. Then, add a second data file by using file system storage. This second data file should be **30 MB** in size. For both techniques, use the show SQL functionality to view the supporting SQL statements.

Step	Window/Page Description	Choices or Values
a.	orcl database home page	Select Administration > Storage > Tablespaces
b.	Database Credentials	For Credential, select Preferred . Select SYSDBA Database Credentials . Click Login .
c.	Tablespaces	Select the <code>INVENTORY</code> tablespace. Click Edit .
d.	Edit Tablespace: INVENTORY	In the Datafiles region, click Edit .
e.	Edit Tablespace: INVENTORY: Edit Datafile	Change File Size to 40 MB . Click Continue .
f.	Edit Tablespace: INVENTORY	Click Show SQL . Note: An <code>ALTER DATABASE</code> statement is used to change the size of a data file. Click Return .

Show SQL

```
ALTER DATABASE DATAFILE '/u01/app/oracle/oradata/orcl/inventory01.dbf' RESIZE 40M
```

Step	Window/Page Description	Choices or Values
g.	Edit Tablespace: INVENTORY	In the Datafiles region, click Add .

Step	Window/Page Description	Choices or Values
h.	Add Datafile	File Name: inventory02.dbf File Size: 30 MB Click Continue .
i.	Edit Tablespace: INVENTORY	Click Show SQL . Note: Both actions are included. Notice the SQL statements do not have a semicolon to end the statements. Click Return .
j.	Edit Tablespace: INVENTORY	Click Apply .

Show SQL

[Execute On Multiple Databases](#) [Return](#)

```
ALTER DATABASE DATAFILE '/u01/app/oracle/oradata/orcl/inventory01.dbf' RESIZE 40M
ALTER TABLESPACE "INVENTORY" ADD DATAFILE '/u01/app/oracle/oradata
/orcl/inventory02.dbf' SIZE 30M
```

Notice that there are now two data files for the **INVENTORY** tablespace:

Datafiles							
		Edit Remove		Add			
Select	Name	Directory	Size (MB)	Used (MB)	Maximum File Size (MB)	Auto Extend	
<input checked="" type="radio"/>	inventory01.dbf	/u01/app/oracle/oradata/orcl/	40.00	5.00	0.00	No	
<input type="radio"/>	inventory02.dbf	/u01/app/oracle/oradata/orcl/	30.00	1.00	0.00	No	

5. Log out of Enterprise Manager Cloud Control.
6. Go back to the terminal window and run the **lab_07_02_03.sql** script again. 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 **\$LABS/P7/lab_07_02_03.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 @$LABS/P7/lab_07_02_03.sql
...
Enter password:

Connected to:
...
PL/SQL procedure successfully completed.
```

```
SQL> CREATE TABLE x
  2      (a CHAR(1000)
  3      ) TABLESPACE inventory;

Table created.

SQL> INSERT INTO x
  2      VALUES ('a');

1 row created.

SQL> INSERT INTO x
  2      SELECT * FROM x;

1 row created.

SQL> INSERT INTO x
  2      SELECT * FROM x;

2 rows created.

SQL> INSERT INTO x
  2      SELECT * FROM x;

4 rows created.

SQL> INSERT INTO x
  2      SELECT * FROM x ;

8 rows created.

SQL> INSERT INTO x
  2      SELECT * FROM x ;

16 rows created.

SQL> INSERT INTO x
  2      SELECT * FROM x ;

32 rows created.

SQL> INSERT INTO x
```

```
2  SELECT * FROM x ;  
  
64 rows created.  
  
SQL> INSERT INTO x  
2  SELECT * FROM x ;  
  
128 rows created.  
  
SQL> INSERT INTO x  
2  SELECT * FROM x ;  
  
256 rows created.  
  
SQL> INSERT INTO x  
2  SELECT * FROM x ;  
  
512 rows created.  
  
SQL> INSERT INTO x  
2  SELECT * FROM x ;  
  
1024 rows created.  
  
SQL> INSERT INTO x  
2  SELECT * FROM x ;  
  
2048 rows created.  
  
SQL> COMMIT;  
  
Commit complete.  
  
SQL> quit
```

- c. Note that the same number of row inserts is attempted, but there is no error because of the increased size of the tablespace.

7. In a terminal window, run the `$LABS/P7/lab_07_02_06.sql` script in SQL*Plus as the `dba1` user to clean up the tablespace for later practice sessions.

```
$ sqlplus dba1 @$LABS/P7/lab_07_02_06.sql  
...  
Enter password:  
Connected to:  
...  
SQL> drop table x purge  
2 /  
Table dropped.  
SQL> exit
```

Practices for Lesson 8: Managing Space

Chapter 8

Practices for Lesson 8: Overview

Lesson Overview

Background: To prepare for an upcoming merger, you want to set the warning and critical thresholds to a lower value than the default. Ensure that you receive early warnings to give you more time to react. When you finish your test case, drop the tablespace that you used.

Practice 8-1: Managing Storage

Overview

In this practice you will set a tablespace fullness threshold so as to be warned when a tablespace has reached the fullness threshold tolerated.

Task

Access the `orcl` database as the `SYS` user (with the `oracle_4U` password, connect as `SYSDBA`) and perform the necessary tasks through Enterprise Manager Cloud Control or through SQL*Plus. All scripts for this practice are in the `$LABS/P8` directory.

1. Using the `DBMS_SERVER_ALERT.SET_THRESHOLD` procedure, reset the database-wide threshold values for the Tablespace Space Usage metric. Connect to a SQL*Plus session and execute the following procedure:

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$ cd $LABS/P8
$ sqlplus / as sysdba
...
Connected to:
...
SQL> exec DBMS_SERVER_ALERT.SET_THRESHOLD(
  > dbms_server_alert.tablespace_pct_full,-
  > NULL,NULL,NULL,NULL,1,1,NULL,-
  > dbms_server_alert.object_type_tablespace,NULL);
PL/SQL procedure successfully completed.

SQL>
```

2. From your SQL*Plus session, check the database-wide threshold values for the Tablespace Space Usage metric by using the following command (output formatted for clarity):

```
SQL> SELECT warning_value,critical_value
  2  FROM  dba_thresholds
  3  WHERE metrics_name='Tablespace Space Usage'
  4  AND   object_name IS NULL;

WARNING_VALUE CRITICAL_VALUE
-----
85           97

SQL>
```

3. Create a new tablespace called TBSALERT with a 120 MB file called tbsalert.dbf. Make sure that this tablespace is locally managed and uses Automatic Segment Space Management. Do *not* make it auto-extensible, and do *not* specify any thresholds for this tablespace.

```
SQL> CREATE TABLESPACE tbsalert
  2  DATAFILE '/u01/app/oracle/oradata/orcl/tbsalert.dbf'
  3  SIZE 120M REUSE LOGGING EXTENT MANAGEMENT LOCAL
  4  SEGMENT SPACE MANAGEMENT AUTO;

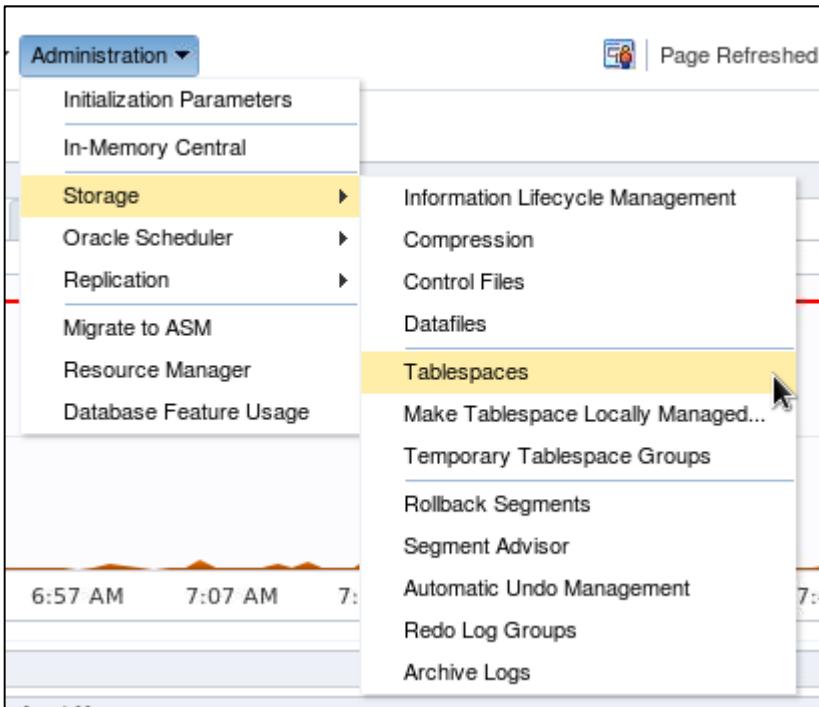
Tablespace created.

SQL> SELECT autoextensible FROM dba_data_files
  2  WHERE tablespace_name='TBSALERT';

AUT
-
NO

SQL>
```

4. In Enterprise Manager Cloud Control, navigate to the orcl database home page. Then Select **Administration > Storage > Tablespaces**.



5. Select the **New** radio button. Enter **sys** in the Username field, **oracle_4U** in the Password field, and choose **SYSDBA** in the Role field. Then click **Login**.

6. Change the Tablespace Space Usage thresholds of the TBSALERT tablespace. Set its warning level to 55 percent and its critical level to 70 percent.
 - a. On the Tablespaces page, select TBSALERT and click **Edit**.
 - b. On the Edit Tablespace: TBSALERT page, click the **Thresholds** tab.
 - c. On the Thresholds tab, click the **Space Used (%)** value link.

Tablespaces > Edit Tablespace: TBSALERT
Edit Tablespace: TBSALERT

Actions Add Datafile Go Execute On Multi

General Storage Thresholds Automatic Data Optimization In-Memory Columnar

Available Space (MB) 120.00 Space Used (MB) 1.00
Space Used (%) 0.83 Available Free Space (MB) 119.00

To view or modify Tablespace Space Used (%) or Free Space (MB) thresholds, navigate to the Database Monitoring Metric and Collection Settings page.
Metric and Collection Settings

- d. If you do not see the TBSALERT tablespace listed, select **Real Time** in the View Data menu.

Tablespace Space Used (%)					
Tablespace Name	Average Value	Low Value	High Value	Last Known Value	Current Severity
EXAMPLE	3.72	3.72	3.72	3.72	✓
INVENTORY	2.86	2.86	2.86	2.86	✓
SYSAUX	3.38	3.36	3.41	3.37	✓
SYSTEM	2.49	2.49	2.49	2.49	✓
USERS	0.12	0.12	0.12	0.12	✓

View Data Last 24 Hours
Real Time
Last 24 Hours
Last 7 Days
Last 31 Days
Custom Time Period...

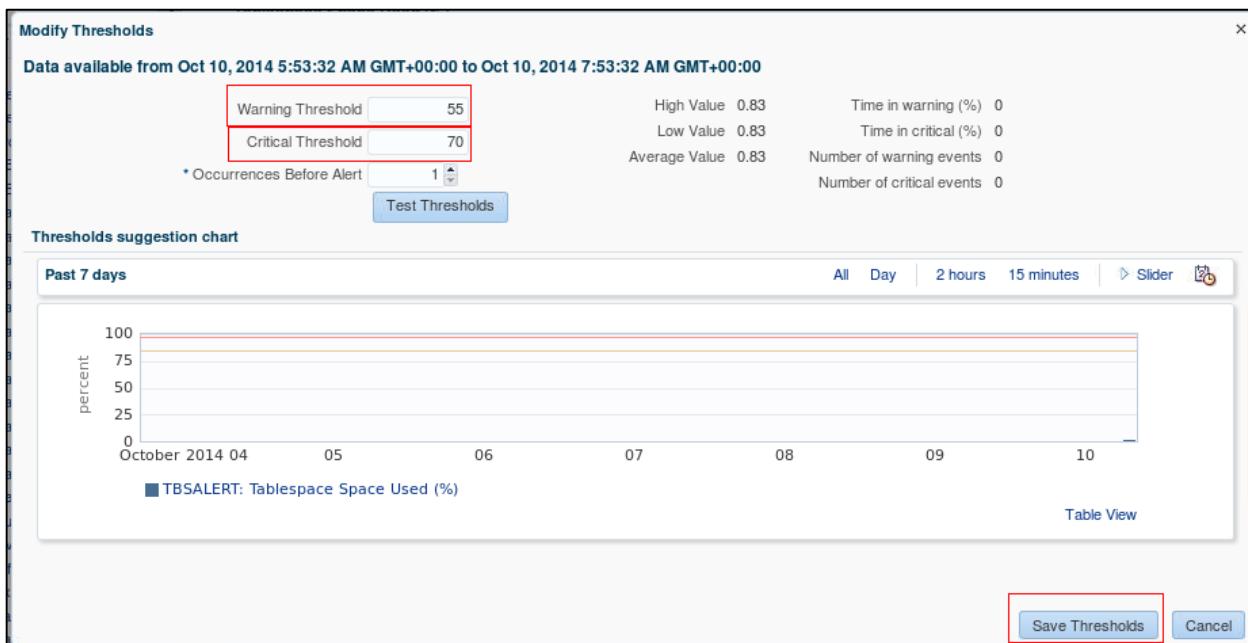
- e. In the Tablespace Name: TBSALERT section, click **Modify Thresholds**.

Tablespace Name : TBSALERT

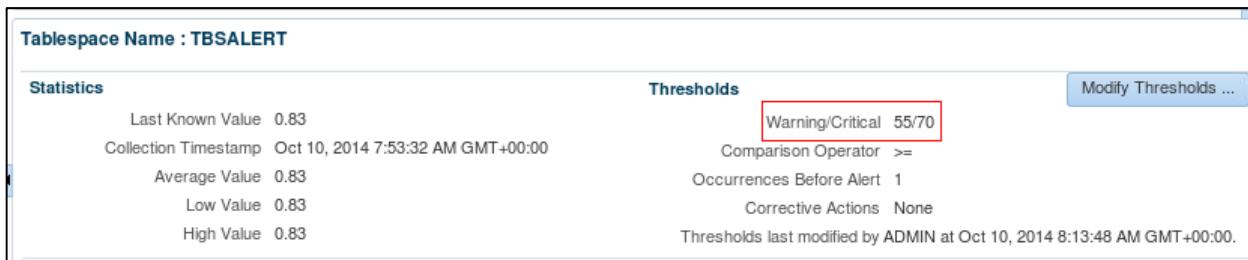
Statistics		Thresholds	
Last Known Value 0.83		Warning/Critical 85/97	
Collection Timestamp Oct 10, 2014 7:53:32 AM GMT+00:00		Comparison Operator >=	
Average Value 0.83		Occurrences Before Alert 1	
Low Value 0.83		Corrective Actions None	
High Value 0.83			

Modify Thresholds ...

- f. On the Modify Thresholds page, enter 55 in the Warning Threshold field and 70 in the Critical Threshold field. Click Save Thresholds.



- g. You receive a confirmation message. Note the updated values in the Thresholds section.



7. Return to your SQL*Plus session and check the new threshold values for the TBSALERT tablespace. In your SQL*Plus session, enter (output formatted):

```
SQL> select warning_value,critical_value
  2  from dba_thresholds
  3  where metrics_name='Tablespace Space Usage' and
  4  object_name='TBSALERT';

WARNING_VALUE CRITICAL_VALUE
-----
55           70

SQL>
```

8. In your SQL*Plus session, query the REASON and RESOLUTION columns from DBA_ALERT_HISTORY for the TBSALERT tablespace. Exit from SQL*Plus.

```
SQL> select reason, resolution
  2  from dba_alert_history
```

REASON	RESOLUT
-----	-----
Threshold is updated on metrics "Tablespace Space Usage" cleared	
SQL> EXIT	
Disconnected ...	
\$	

- Review and execute the `$LABS/P8/seg_advsr_setup.sh` script that creates and populates new tables in the `TBSALERT` tablespace.

```
$ cd $LABS/P8
$ cat seg_advsr_setup.sh
#!/bin/sh
# For training only, execute as oracle OS user

sqlplus /nolog <<EOF
connect / as sysdba
alter system set disk_asynch_io = FALSE scope = spfile;
shutdown immediate;
startup
set echo on
create table employees1 tablespace tbsalert as select * from
hr.employees;
create table employees2 tablespace tbsalert as select * from
hr.employees;
create table employees3 tablespace tbsalert as select * from
hr.employees;
create table employees4 tablespace tbsalert as select * from
hr.employees;
create table employees5 tablespace tbsalert as select * from
hr.employees;

alter table employees1 enable row movement;
alter table employees2 enable row movement;
alter table employees3 enable row movement;
alter table employees4 enable row movement;
alter table employees5 enable row movement;

BEGIN
FOR i in 1..10 LOOP
    insert into employees1 select * from employees1;
    insert into employees2 select * from employees2;
    insert into employees3 select * from employees3;
    insert into employees4 select * from employees4;
```

```
    insert into employees5 select * from employees5;
    commit;
END LOOP;
END;
/
insert into employees1 select * from employees1;
insert into employees2 select * from employees2;
insert into employees3 select * from employees3;
commit;
exit
EOF
$
```

```
$ ./seg_advsr_setup.sh

SQL> Connected.
SQL>
System altered.

SQL> Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> ORACLE instance started.

Total System Global Area 503316480 bytes
Fixed Size                  2926080 bytes
Variable Size                268438016 bytes
Database Buffers             226492416 bytes
Redo Buffers                 5459968 bytes
Database mounted.
Database opened.
SQL> SQL>
Table created.
SQL>
Table altered.
```

```
SQL>
Table altered.
SQL>
Table altered.
SQL>
Table altered.
SQL>
Table altered.
SQL> SQL> 2   3   4   5   6   7   8   9   10  11
PL/SQL procedure successfully completed.
SQL>
109568 rows created.
SQL>
109568 rows created.
SQL>
109568 rows created.
SQL>
Commit complete.

SQL> Disconnected ...
$
```

10. Check the fullness level of the TBSALERT tablespace by using Enterprise Manager Cloud Control or SQL*Plus. The current level should be around 60 percent. Wait a few minutes and check that the warning level is reached for the TBSALERT tablespace. (*If you are too fast and receive errors, just use your browser's Refresh button, or select your destination again.*)

- a. While you are logged in to SQL*Plus as the `SYS` user, enter:

```
$ sqlplus / as sysdba
...
Connected to:
...
SQL> select sum(bytes) *100 /125829120
  2  from dba_extents
  3  where tablespace_name='TBSALERT';

SUM(BYTES) *100/125829120
-----
60
SQL>
```

Note: You created the tablespace with 120 MB (125829120 bytes) of space

- b. Enter the following query. Your results should be similar to the following:

```
SQL> select reason
  2  from dba_outstanding_alerts
  3  where object_name='TBSALERT';

REASON
-----
Tablespace [TBSALERT] is [60 percent] full

SQL>
```

Note: If your result is “no rows selected,” wait a little longer and repeat the query.

- c. In Enterprise Manager Cloud Control, return to the **Tablespaces** page.
d. On the Tablespaces page, see Allocated Space Used (%).

Select	Name	Available Space Used(%)	Allocated Space Used(%)	Auto Extend	Allocated Size(MB)	Space Used(MB)
<input checked="" type="radio"/>	EXAMPLE	3.7	98.0	YES	1,243.8	1,219.1
<input type="radio"/>	INVENTORY	2.9	2.9	NO	70.0	2.0
<input type="radio"/>	SYSAUX	2.7	94.3	YES	950.0	895.6
<input type="radio"/>	SYSTEM	2.5	99.9	YES	810.0	808.9
<input type="radio"/>	TBSALERT	60.8	60.8	NO	120.0	73.0
<input type="radio"/>	TEMP	0.0	2.5	YES	197.0	5.0

- e. Select Oracle Database > Monitoring > Incident Manager.



- f. Click **Events without incidents**.

Severity	Summary
No data found	

- g. You should see the new alert. It might take several minutes for the alert to appear.

Severity Message	Target Name	Target Type	Event Reported	Category	Last Updated	Incident ID
User SYS logged on from EDRSR9P1.	orcl	Database Inst...	Oct 10, 2014 9:43...	Security	Oct 10, 2014 9:43...	
Tablespace [TBSALERT] is [60.833 percent] full	orcl	Database Inst...	Oct 10, 2014 9:29...	Capacity	Oct 10, 2014 9:29...	

11. In your SQL*Plus session, execute the inserts below to add more data to TBSALERT. Wait a few moments and view the critical level through a query in SQL*Plus and Enterprise Manager Cloud Control. Verify that TBSALERT fullness is around 75 percent.

- a. Execute the following commands:

```
SQL> insert into employees4 select * from employees4;
109568 rows created.

SQL> commit;

Commit complete.

SQL> insert into employees5 select * from employees5;
109568 rows created.

SQL> commit;

Commit complete.

SQL>
```

- b. Wait a few minutes and view the critical level. Verify that TBSALERT fullness is around 75 percent. In SQL*Plus, enter:

```
SQL> select sum(bytes) *100 /125829120
  2  from dba_extents
  3  where tablespace_name='TBSALERT';

SUM(BYTES)*100/125829120
-----
75

SQL>
```

- c. Check the outstanding alerts. You may need to wait a few minutes.

```
SQL> select reason, message_level
  2  from dba_outstanding_alerts
  3  where object_name='TBSALERT';

REASON                                MESSAGE_LEVEL
-----
Tablespace [TBSALERT] is [75 percent] full          1

SQL>
```

- d. In Enterprise Manager Cloud Control, navigate to the **Administration > Storage > Tablespaces** page, and review Allocated Space Used (%).

Actions	Add Datafile	Go	Select	Name	Available Space Used(%)	Allocated Space Used(%)	Auto Extend	Allocated Size(MB)	Space Used(MB)
			<input checked="" type="radio"/>	EXAMPLE	3.7	98.0	YES	1,243.8	1,219.1
			<input type="radio"/>	INVENTORY	2.9	2.9	NO	70.0	2.0
			<input type="radio"/>	SYSAUX	2.7	94.3	YES	950.0	895.6
			<input type="radio"/>	SYSTEM	2.5	99.9	YES	810.0	808.9
			<input type="radio"/>	TBSALERT	75.8	75.8	NO	120.0	91.0
			<input type="radio"/>	TEMP	0.0	2.0	YES	197.0	4.0

- e. Navigate to **Oracle Database > Home** and check the list of incidents and problems in the **Incidents and Problems** section.

Or navigate to **Oracle Database > Monitoring > Incident Manager** and click **Events without incidents**. You should see the new alert.

It will take several minutes for the change in status to take effect.

Note: You should now see a red flag instead of the yellow one. Check “All open incidents” if you do not see the event in “Events without incidents.”

Incident Manager: All open incidents

Views Search

Actions View View search criteria Acknowledge Clear ...

Severity	Summary	Target	Priority	Status	Last Updated
	Tablespace [TBSALERT] is [75.833 perc...]	orcl	None	New	Oct 10, 2014 9:58:28 ...

Out-of-box
My open incidents and problems
Unassigned incidents
Unacknowledged incidents

12. In your SQL*Plus session, execute the following delete statements to delete rows from tables in TBSALERT. These statements will take several minutes to complete. Then exit your SQL*Plus session.

```
SQL> delete employees1;
```

```
219136 rows deleted.
```

```
SQL> commit;
```

```
Commit complete.
```

```
SQL> delete employees2;
```

```
219136 rows deleted.
```

```
SQL> commit;
```

```
Commit complete.
```

```
SQL> delete employees3;
```

```
219136 rows deleted
```

```
SQL> commit;
```

```
Commit complete.
```

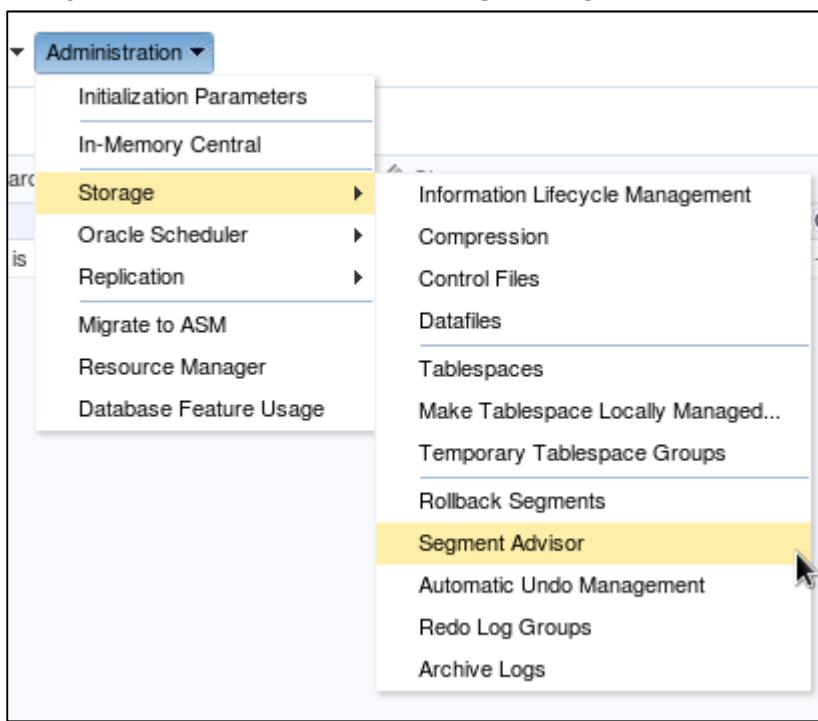
```
SQL> exit
```

```
SQL> Disconnected ...
```

```
$
```

13. Now, run the Segment Advisor for the TBSALERT tablespace in Enterprise Manager Cloud Control. Make sure that you run the Advisor in Comprehensive mode without time limitation. Accept and implement its recommendations. After the recommendations have been implemented, check whether the fullness level of TBSALERT is below 55 percent.

a. Navigate to **Administration > Storage > Segment Advisor**.



- On the Segment Advisor Recommendations page, select **Run Segment Advisor Manually** in the Related Links section.
- On the Segment Advisor: Scope page, select **Tablespaces**. Then click **Next**.

Logged in as sys

Oracle Database ▾ Performance ▾ Availability ▾ Security ▾ Schema ▾ Administration ▾

Scope Objects Schedule Review

Segment Advisor: Scope

Database orcl Logged In As sys Cancel Step 1 of 4 Next

Automatic Segment Advisor Information

Beginning in Oracle Database 11, Oracle provides an Automatic Segment Advisor task which automatically detects segment issues.

You can get advice on shrinking segments for individual schema objects or entire tablespaces.

Tablespaces Schema Objects

Overview

The segment advisor determines whether objects have unused space that can be released, taking estimated future space requirements into consideration. The estimated future space calculation is based on historical trends.

Cancel Step 1 of 4 Next

- On the Segment Advisor: Tablespaces page, click **Add**, and select **TBSALERT**. Click **OK**, and then click **Show Advanced Options**.
- In the Options section, select **Unlimited**. Then click **Next**.

Scope Objects Schedule Review

Segment Advisor: Tablespaces

Database orcl Logged In As sys Cancel Back Step 2 of 4 Next Submit

Name	Type	Extent Management	Segment Space Management	Size (MB)	Used (MB)	Used (%)	Remove
TBSALERT	PERMANENT	LOCAL	AUTO	120.00	91.00	75.83	

Options

Hide Advanced Options

Time Limit for Analysis

Unlimited Limited

Time Limit (mins)

Advisory Results Retention (days) 30

- f. On the Segment Advisor: **Schedule** page, make sure **Immediately** is selected. Select your proper time zone (ask your Instructor) and click **Next**.

- g. On the Segment Advisor: Review page, click **Show SQL**.

```
Create task and objects script
DECLARE

taskname varchar2(100);
taskdesc varchar2(128);
task_id number;
object_id number;
timeLimit varchar2(25);
numDaysToRetain varchar2(25);
objectName varchar2(100);
objectType varchar2(100);

BEGIN
taskname := 'SEGMENTADV_9329905';
taskdesc :='Get shrink advice based on object growth trend';
numDaysToRetain :='30';
dbms_advisor.create_task('Segment Advisor',?,taskname,taskdesc,NULL);
dbms_advisor.create_object(taskname, 'TABLESPACE', 'TBSALERT', ' ', ' ', NULL, object_id);
dbms_advisor.set_task_parameter(taskname, 'RECOMMEND_ALL', 'TRUE');
dbms_advisor.set_task_parameter(taskname, 'DAYS_TO_EXPIRE', numDaysToRetain);
END;

Execute task script
DECLARE
taskname varchar2(100);
BEGIN
taskname := 'SEGMENTADV_9329905';
dbms_advisor.reset_task(taskname);
dbms_advisor.execute_task(taskname);
END;
```

- Review the statements and click **Return**.
- On the Segment Advisor: Review page, click **Submit**.

- This takes you back to the Segment Advisor Recommendations page. Select **Advisor Central** in the Related Links section.
- On the Advisor Central page in the Advisor Tasks section, click the **SEGMENTADV_nnnnnnnn** link when the task status shows COMPLETED.

- You can see that there are three recommendations for the TBSALERT tablespace. Click the **3** in the Recommendations column.

- Click **Select All**, and then click **Shrink**.

- n. On the Shrink Segment: Options page, make sure that you select “**Compact Segments and Release Space.**” Click **Show SQL**.

Shrink Segment: Options

The shrink operation compacts fragmented space and, optionally, frees the space. The shrink operation will take some time and will be scheduled as a job.

Compact Segments and Release Space
This will first compact the segments and then release the recovered space to the tablespace. During the short space release phase, any cursors referencing this segment may be invalidated and queries on the segment could be affected.

Compact Segments
Compacting will compact segment data without releasing the recovered space. After compacting the data, the recovered space can be quickly released by running Compact Segments and Release Space.

Show SQL **Cancel** **Implement**

- o. Review the statements and click **Return**.

Show SQL

```
alter table "SYS"."EMPLOYEES3" shrink space
alter table "SYS"."EMPLOYEES1" shrink space
alter table "SYS"."EMPLOYEES2" shrink space
```

Show SQL **Cancel** **Implement**

- p. On the Shrink Segment: Options page, click **Implement**.
q. On the Shrink Segment: Schedule page, click **Submit**.

Shrink Segment: Schedule

TIP This operation may be resource-intensive and should be scheduled during off-peak hours.

Job Information

* Job Name: SQLSCRIPT_2556116
Job Description:

Schedule

Schedule Type: Standard

Time Zone: (UTC+00:00) Universal Time

Repeating: Do Not Repeat

Start: Immediately

Date: Oct 10, 2014
(example: Oct 10, 2014)

Time: 10:45:00 AM

Submit

Cancel **Submit**

- r. On the Scheduler Jobs page, click the SQLSCRIPT_*nnnnnnn* link.

Scheduler Jobs									
Page Refreshed Oct 10, 2014 10:36:45 AM UTC									
All Running History Refresh Create 									
View Job Status Stop Run View Job Definition Edit Job Definition Delete									
Select	Status	Name	Schema	Start Date	Elapsed Time (seconds)	CPU Used (seconds)	Session ID	Resource Consumer Group	Previous Runs
<input checked="" type="radio"/>		SQLSCRIPT_2556116	SYS	Oct 10, 2014 10:36:41 AM +00:00	6.49	.69	275	OTHER_GROUPS	0

- s. On the View Job page, scroll to the bottom of the page. Under Operation Detail, you should see that the job succeeded. (If it is still running, use your browser's Refresh button). Then click **OK**.

Scheduler Jobs > View Job: SYS.SQLSCRIPT_2556116

Logged in as SYS

View Job: SYS.SQLSCRIPT_2556116

OK

General

Name SQLSCRIPT_2556116

Schema SYS

Command

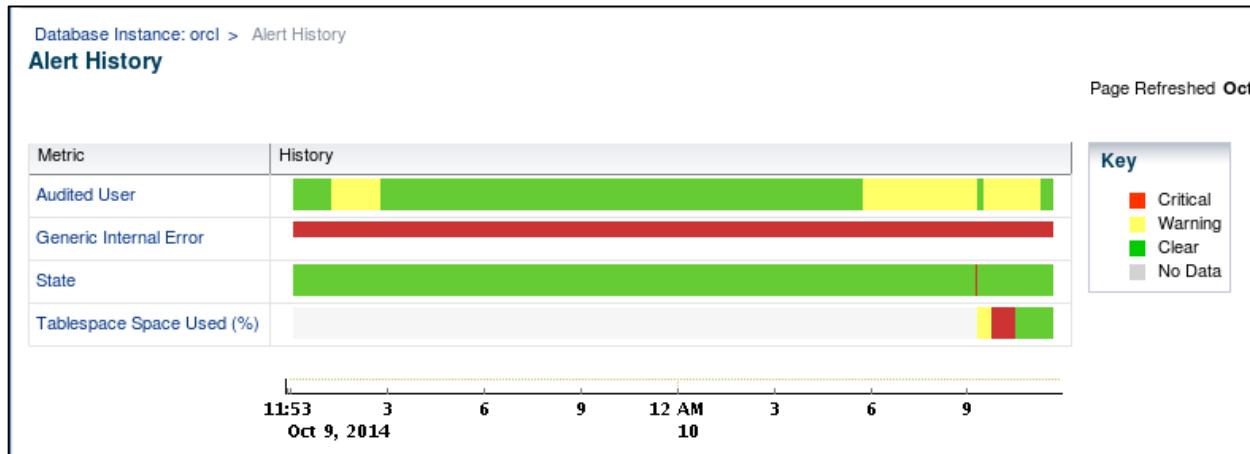
Operation Detail

View	Select	Log ID	Log Date	Operation	Status
	<input checked="" type="radio"/>	13892	Oct 10, 2014 10:36:52 AM +00:00	RUN	SUCCEEDED

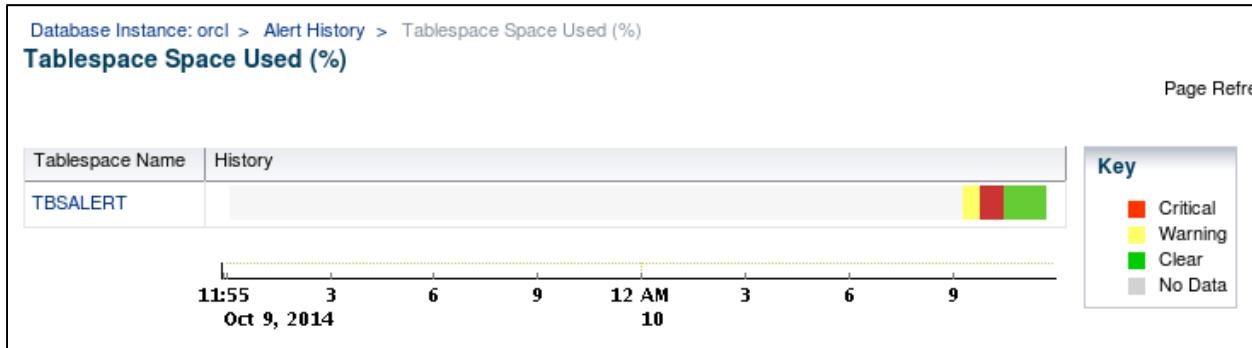
14. Wait a few minutes and check that there are no outstanding alerts for the TBSALERT tablespace. Navigate to the **Oracle Database > Monitoring > Incident Manager > Events without incidents**.

Incident Manager: Events without incidents						
Views	Search	Actions ▾ View ▾		View search criteria	Clear ...	
 Out-of-box		Severity	Message	Target Name	Target Type	Event Reported
My open incidents and problems	Unassigned incidents	Severity	Message	Target Name	Target Type	Event Reported
			User SYS logged on from EDRSR9P1.	orcl	Database Inst...	Oct 10, 2014 9:43...
					Security	Oct 10, 2014 9:43...

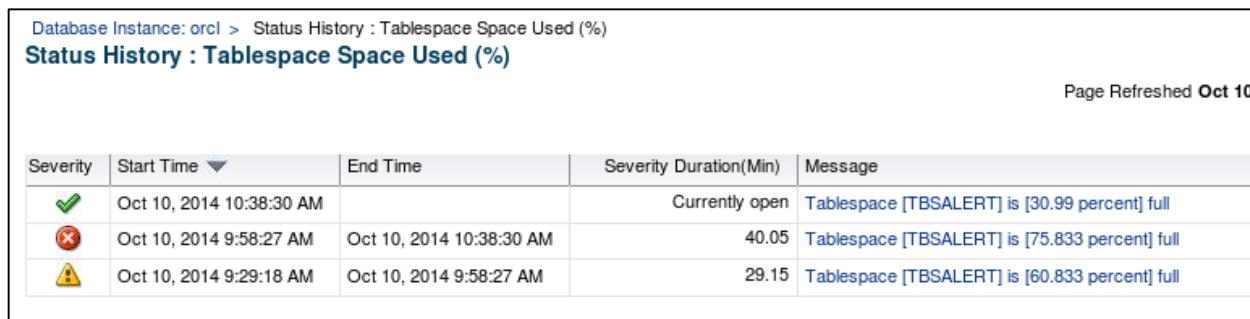
15. Retrieve the history of the TBSALERT Tablespace Space Usage metric for the last 24 hours.
- Navigate to **Oracle Database > Monitoring > Alert History**.
 - Click the **Tablespaces Space Used (%)** colored bar in the History column.



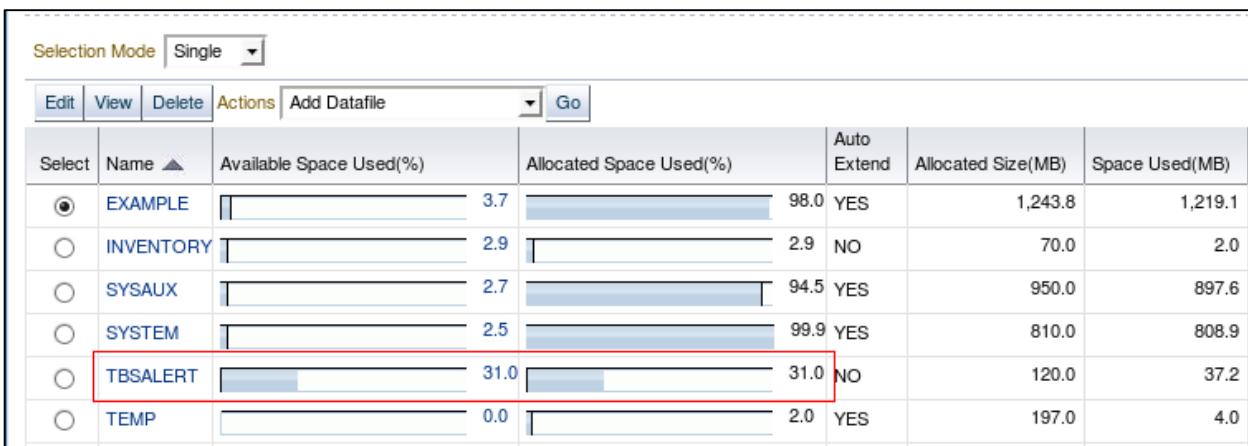
- Click the colored bar in the History column.



- This takes you to the Status History: Tablespace Space Used (%). Select “Last 24 hours” from the View Data drop-down list. Note that your display may vary somewhat from what is shown in the screenshot.



16. Verify that the TBSALERT tablespace fullness has decreased below the threshold because space has been reclaimed. In Enterprise Manager Cloud Control, navigate to **Administration > Storage > Tablespaces**.



Selection Mode	Single						
	Edit	View	Delete	Actions	Add Datafile	Go	
Select	Name	Available Space Used(%)	Allocated Space Used(%)	Auto Extend	Allocated Size(MB)	Space Used(MB)	
<input checked="" type="radio"/>	EXAMPLE	3.7	98.0	YES	1,243.8	1,219.1	
<input type="radio"/>	INVENTORY	2.9	2.9	NO	70.0	2.0	
<input type="radio"/>	SYSAUX	2.7	94.5	YES	950.0	897.6	
<input type="radio"/>	SYSTEM	2.5	99.9	YES	810.0	808.9	
<input type="radio"/>	TBSALERT	31.0	31.0	NO	120.0	37.2	
<input type="radio"/>	TEMP	0.0	2.0	YES	197.0	4.0	

17. Log in to SQL*Plus as the **SYS** user. In SQL*Plus, reset the TBSALERT tablespace Tablespace Space Usage metric. Exit from SQL*Plus.

```
$ sqlplus / as sysdba
...
Connected to:
...
SQL> EXEC DBMS_SERVER_ALERT.SET_THRESHOLD(
> 9000,NULL,NULL,NULL,NULL,1,1,NULL,5,'TBSALERT')

PL/SQL procedure successfully completed.

SQL> SELECT warning_value,critical_value
  2  FROM dba_thresholds
  3  WHERE metrics_name='Tablespace Space Usage'
  4  AND object_name='TBSALERT';

no rows selected

SQL> EXIT
Disconnected ...
$
```

18. **Note: This is a mandatory cleanup step.** Review, and then execute the `seg_advsr_cleanup.sh` script in the `$LABS/P8` directory to drop your `TBSALERT` tablespace.

```
$ cat seg_advsr_cleanup.sh
#!/bin/sh
# For training only, execute as oracle OS user

sqlplus /nolog <<EOF
connect / as sysdba
alter system set disk_asynch_io = TRUE scope = spfile;
shutdown immediate;
startup
drop tablespace tbsalert including contents and datafiles;
exit
EOF
$
```

```
$ ./seg_advsr_cleanup.sh
SQL> Connected.
SQL>
System altered.

SQL> Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> ORACLE instance started.

Total System Global Area 503316480 bytes
Fixed Size                 2926080 bytes
Variable Size              268438016 bytes
Database Buffers           226492416 bytes
Redo Buffers                5459968 bytes

Database mounted.
Database opened.
SQL>
Tablespace dropped.

SQL>
$
```

Practices for Lesson 9: Managing Undo Data

Chapter 9

Practices for Lesson 9: Overview

Practices Overview

Background: The business users and management in your organization decide that they need to have 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 9-1: 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. Enterprise Manager Database Express enables you to change the undo tablespaces and perform undo analysis. For this practice you will use Oracle Enterprise Manager Cloud Control.

1. In Cloud Control, as the **ADMIN** user, navigate to the `orcl` database and view the undo related system activity.

Step	Window/Page Description	Choices or Values
a.	Cloud Control login	login as User: Admin Password: oracle_4U
b.	Cloud Control: Summary	Click Targets > Databases
c.	Databases	Verify Search List is selected Click orcl .
d.	orcl	Click Administration > Storage > Automatic Undo Management
e.	Database Login	Select Credential: Preferred Select Preferred Credential Name: SYSDBA Database Credentials Click Login .
f.	Automatic Undo Management: General tab	Review the settings for the analysis. Click the System Activity tab.
g.	Automatic Undo Management: System Activity tab	View System Activity.

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. To specified analysis period or the desired undo retention. The system activity for the specified time period can be viewed in the System Activity tab.

System Activity During Analysis Period	
Selected Analysis Time Period Oct 6, 2014 9:00:00 AM UTC To Oct 13, 2014 9:00:00 AM UTC	
Longest Running Query (minutes) 35.0	
Average Undo Generation Rate (KB/minute) 77.0	
Maximum Undo Generation Rate (KB/minute) 2,142.0	
Queries failed due to low Retention 0	
Transactions failed due to small Undo Tablespace 0	

Show Graph

Note: The values you see on the Enterprise Manager Cloud Control pages and graphs may vary from what is shown in the screenshots in this guide.

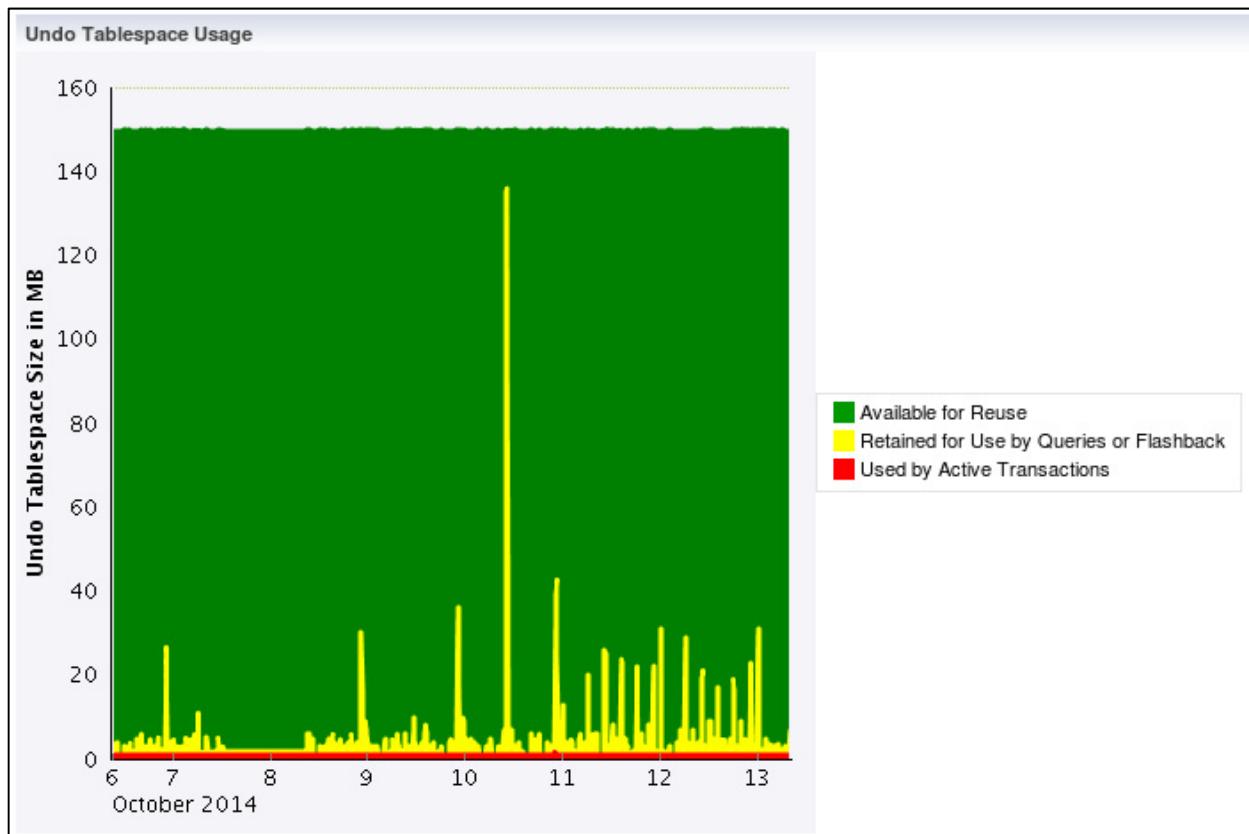
Question: Looking at the preceding screenshot, how many errors did this system encounter?

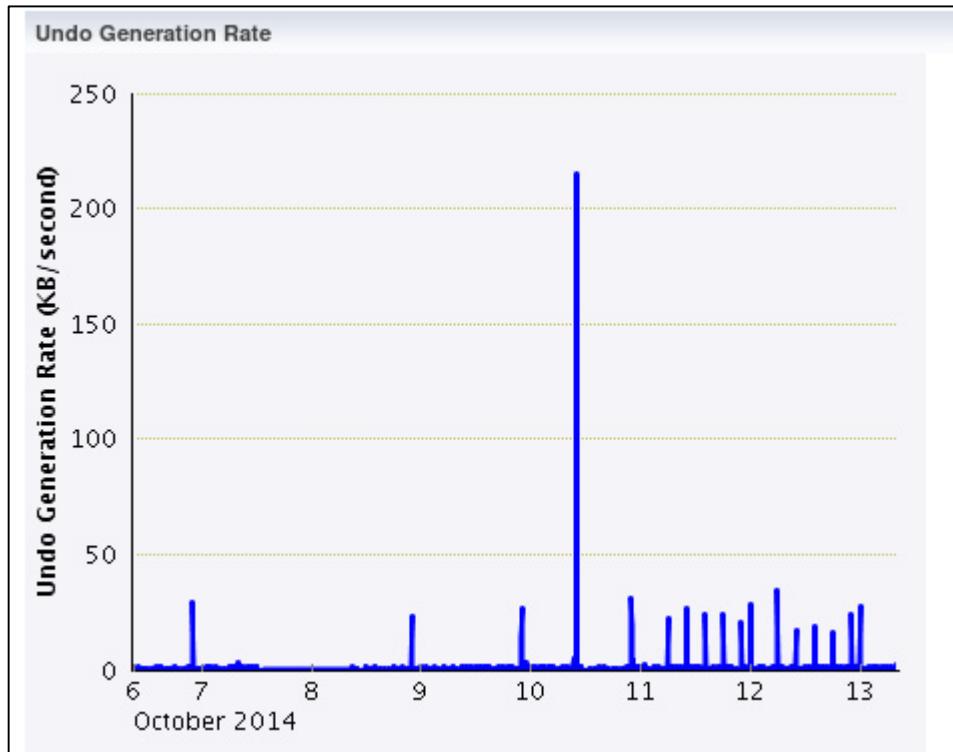
Answer: None. When the undo tablespace is set to auto-extend, there should not be any failed transactions due to small undo tablespace errors.

Question: Looking at the preceding screenshot, what is the duration of the longest running query?

Answer: 35 minutes (The value in your system may be different.)

Step	Window/Page Description	Choices or Values
h.	Automatic Undo Management: System Activity tab	Click Show Graph to show related graphs.





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.

Step	Window/Page Description	Choices or Values
a.	Automatic Undo Management: System Activity tab	Click the General tab.
b.	Automatic Undo Management: General tab	Under the Undo Advisor section, select “Specified manually to allow for longer duration queries or flashback.” Enter 48 hours as Duration. Click Run Analysis .

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 flashback duration (except for Flashback Database). The undo tablespace should be sized large enough to hold the 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

Run Analysis

Step	Window/Page Description	Choices or Values
c.	Automatic Undo Management: General tab	Examine Analysis Results.

Analysis Results

Selected Analysis Time Period: Oct 6, 2014 9:00:00 AM UTC To Oct 13, 2014 9:00:00 AM UTC

Minimum Required Undo Tablespace Size (MB): 423

Recommended Undo Tablespace Size (MB): 163

TIP Oracle advises that you configure the undo tablespace to be three times the Recommended Undo Tablespace

Potential Problems: No Problem Found
 Recommendations: No Recommendation

Make note of the recommended undo tablespace size. **Note:** Your recommended size might be different from what is shown here.

Step	Window/Page Description	Choices or Values
d.	Automatic Undo Management: General tab	Change the UNDO_RETENTION value.

Step	Window/Page Description	Choices or Values
		Click Edit Undo Retention .
e.	Initialization Parameters	Set Value to 172800 seconds. Check Apply changes in current running instance(s) mode to SPFile .
f.	Initialization Parameters	Click Show SQL (upper right corner of page). Click Return .

Initialization Parameters

Current 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	All	All	All	All	Go
undo_retention	All	All	All	All	All	All	All	All	Go

Filter on a name or partial name

Apply changes in current running instance(s) mode to SPFile. For static parameters, you must restart the database.

Name ▲	Help	Value	Comments	Type	Basic	Mo
undo_retention	i	172800		Integer		

Initialization Parameters > Show SQL Logged in As SYS

Show SQL

ALTER SYSTEM SET undo_retention = 172800 SCOPE=BOTH

Execute On Multiple Databases Return

Execute On Multiple Databases Return

Step	Window/Page Description	Choices or Values
g.	Initialization Parameters	Click Apply . Select Administration > Storage > Automatic Undo Management
h.	Automatic Undo Management: General tab	Change the Undo tablespace size to the recommended value. Click Edit Undo Tablespace .
i.	Edit Tablespace: UNDOTBS1	In Datafiles section, Click Edit to change the data file size.
j.	Edit Tablespace: UNDOTBS1: Edit Datafile	Change File Size to the value you determined when you ran the Undo Advisor (163 MB is the value in the preceding screenshot). Click Continue .

Step	Window/Page Description	Choices or Values
k.	Edit Tablespace: UNDOTBS1	Click Show SQL .
l.	Show SQL	Verify the SQL command that will be executed. Click Return .
m.	Edit Tablespace: UNDOTBS1	Click Apply .

3. Go back to the **Automatic Undo Management** page to see the results of the changes that 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 that you made to the size of the data file 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. analysis can be performed based on the specified analysis period or the desired undo retention. The system activity for the specified time period can viewed in the System Activity tab.

General	System Activity
Undo Retention Settings Undo Retention (minutes) 2880 Retention Guarantee No	Undo Tablespace for this Instance Tablespace UNDOTBS1 Size (MB) 163 Auto-Extensible Yes

Question: Which Flashback operations are potentially affected by this change?

Answer: Flashback query, Flashback transaction, and Flashback table.

Question: Does undo data survive the shutdown of a database?

Answer: Yes, undo is persistent.

Practices for Lesson 10: Managing Data Concurrency

Chapter 10

Practices for Lesson 10: Overview

Practices Overview

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.

Practice 10-1: 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.

1. Users NGREENBERG and SMAVRIS already exist in your database. User NGREENBERG makes an uncommitted update to a row in the HR.EMPLOYEES table. Then user SMAVRIS attempts to update the same row.
 - a. Ensure your environment is configured for the orcl database by executing the oraenv command in each terminal window.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
...
$
```

- b. In one terminal window, invoke SQL*Plus and connect as NGREENBERG with the password of oracle_4U. Perform the update shown below. Do NOT commit or exit the SQL*Plus session.

```
$ sqlplus ngreenberg
...
Enter password:

Connected to:
...
SQL> show user
USER is "NGREENBERG"
SQL> update hr.employees set phone_number='650.555.1212'
   2> where employee_id = 110;

1 row updated.

SQL>
```

- c. Leave this session connected in the state that it is currently. **Do not** exit at this time.
2. In a separate terminal window, attempt to update the same row in a separate session by executing the SQL statement shown below. Do not worry if the session seems to “hang”—this is the condition that you are trying to create.
 - a. Open a second terminal window. Log in to SQL*Plus as the SMAVRIS user with the password oracle_4U.

```
$ sqlplus smavris
...
Enter password:
...
```

```
SQL> update hr.employees set salary=8300
2> where employee_id = 110;
```

- b. Notice that this session appears to be hung. Leave this session as is and move on to the next step.
3. Using EM Express, navigate to the Current Findings tab of the Performance Hub page and determine which session is causing the locking conflict.
 - a. In EM Express, select **Performance > Performance Hub**. Then click the **Current ADDM Findings** tab. In the Findings section, click the detail finding “Unresolved hangs or session wait chains.”

Finding	Scope	Priority
Unresolved hangs or session wait chains		
Unresolved hangs or session wait chains		
SQL statements consuming significant database time		

- b. In the Details section, you should see two sessions listed. The first session is the blocker. In the example, the Session ID of the blocker is 1:38,45678. The session ID that you see will be different. Record the Session ID _____.

Session ID	Blocker T...	Process	Blockers
1:38,45678		Foreground	
1:272,6374		Foreground	1:38,45678

Note: You will resolve the blocking session in Enterprise Manager Cloud Control in subsequent steps. However, note that you could execute the following statement as SYSDBA to kill the session:

```
ALTER SYSTEM KILL SESSION (38,45678);
```

You could also issue the following command as an OS sys administrator to stop the OS process associated with the blocking session.

```
$ kill 26623
```

4. Using Cloud Control, find the details of the blocking session.
 - a. Log in to Cloud Control as the `admin` user with the password `oracle_4U`. Then navigate to the `orcl` home page.

- b. Because Susan Mavris doesn't know what is wrong, you start Real Time ADDM to diagnose the problem. Select **Performance > Real Time ADDM**.
- c. If you are asked to provide credentials, select Preferred and SYSDBA Database Credentials in the SYSDBA Credentials section. In the DB Host Credentials section, select New and enter `oracle` in the User Name field. Enter your OS password in the Password and Confirm Password fields. Then click **Submit**.
- d. On the Real Time ADDM page, in the Results section, click **Start**.
- e. When the Number of Findings field shows a value, click the **Findings** tab.

The screenshot shows the 'Real-Time ADDM Results' page. At the top, there are three buttons: 'Start' (green), 'Stop' (grey), and 'Restart' (blue). Below them is a navigation bar with tabs: 'Progress' (grey), 'Findings' (blue, highlighted with a red box), 'Hardware Resources' (grey), 'Activity' (grey), 'Hang Data' (grey), and 'Statistics' (grey). The status is shown as 'Status: Finished'. Underneath, it says 'Time Window Begin: Mon Oct 13, 2014 9:04:00 AM' and 'Time Window End: Mon Oct 13, 2014 9:09:28 AM'. A red box highlights the 'Number of Findings: 2' text.

- f. On the Finding tab, notice the same information about blocking sessions that you saw in EM Express.

The screenshot shows the 'Real-Time ADDM Results' page with the 'Findings' tab selected. At the top, there are three buttons: 'Start' (green), 'Stop' (grey), and 'Restart' (blue). To the right are 'Save' and 'Mail' buttons. Below them is a navigation bar with tabs: 'Progress' (grey), 'Findings' (blue), 'Hardware Resources' (grey), 'Activity' (grey), 'Hang Data' (grey), and 'Statistics' (grey). The main area is a table with columns: 'Priority' (High), 'Performance Impact' (100 and 96.73), 'Finding' (Unresolved hangs or session wait chains and SQL statements consuming significant database time), and 'Actions' (Kill Session button).

Priority	Performance Impact	Finding	Actions
High	100	Unresolved hangs or session wait chains Recommendation 1: Kill the session with ID [1,38,45678] (instance number, SID, serial number)	Kill Session
High	96.73	SQL statements consuming significant database time	

- g. Click the Hang Data tab. Notice that this tab gives you the session details of the blocking session such as username. You could contact NGREENBERG directly and ask her to commit or roll back the transaction, or you could kill her session. Do NOT kill the session at this time. Continue to investigate the issue.

Hang Analysis

Final Blockers **Blocked Sessions**

Top Final Blockers by cumulative blocking time

Session Id	Num Waiters	Cumulative ...	User Name	Program Na...	Service	Module	Action
38	1	675	NGREENBERG	sqlplus@EDRSR9P1	SYS\$USERS	SQL*Plus	- No Value -

Details of Session 38

Session Serial #	: 45678	SQL ID	: No Value	P1	: 1650815232
P2	: 1	P3	: 0	P1 Text	: driver id
P2 Text	: #bytes	P3 Text	: No Value	OS Process Id	: 26623

Waiters on Session 38

Session Id	Secs in wait	User Name	Program Name	Module	Action	wait_event_te...
272	675	SMAVRIS	sqlplus@EDRSR9P1	SQL*Plus	- No Value -	enq: TX - row lock contention

5. What was the last SQL statement that the blocking session executed?

- Click Performance > Blocking Sessions.
- Select the NGREENBERG session, and then click **View Session**.

Blocking Sessions

Logged in as SYS

Page Refreshed Oct 13, 2014 9:14:57 AM UTC [Refresh](#)

View Session **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	38	45678		Idle	SQL*Net message from client	1650815232	1	0	1106
<input type="radio"/>	SMAVRIS	0	272	6374	bk3sumaapsy1b	Application	enq: TX - row lock contention	1415053318	524297	2371	997

- Under the Application heading, click the hash value link for **Current SQL** or **Previous SQL**.

- d. Note the SQL that was most recently run. Seeing the last SQL statement can help you to decide which session to kill.

Top Activity > SQL Details: gh1ks1w4wa478
SQL Details: gh1ks1w4wa478

Switch to SQL ID | Go | View Data | Real Time: Manual Refresh | Refresh

Text

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

6. Resolve the conflict in favor of the user who complained, by killing the *blocking* session.
- Click **Performance > Blocking Sessions**.
 - Select the NGREENBERG session, and then click **Kill Session**.
 - On the Confirmation page, choose the Option **Kill Immediate**. Click **Show SQL**.
 - On the Show DDL page, the SQL statement is shown.

Top Activity > Session Details: 38 (NGREENBERG) > Kill Session > Show SQL
Show DDL

```
ALTER SYSTEM KILL SESSION '38,45678' IMMEDIATE
```

- Click **Return**.
- Click **Yes**.
- On the Blocking Sessions page, the listing is gone, and an information message appears saying that session *nnn* has been killed.

Logged in as SYS

Information
Session 38 has been killed successfully.

Blocking Sessions

Page Refreshed Oct 13, 2014 9:22:33 AM UTC | Refresh

Select	Username	Sessions Blocked	Session ID	Serial Number	SQL ID	Wait Class	Wait Event	P1 Value	P2 Value	P3 Value	Seconds in Wait
	No sessions found to be currently blocking other sessions.										

7. Return to the SQL*Plus command window, and note that SMAVRIS's update has now completed successfully. Issue a ROLLBACK command in this session and exit.

```
SQL> update hr.employees set salary=8300
2> where employee_id = 110;

1 row updated.

SQL> ROLLBACK;

Rollback complete.

SQL> exit
$
```

8. 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: 26623
Session ID: 38 Serial number: 45678
SQL>
```

Answer: The session has been disconnected. There could be other errors such as:

- ORA-12571: TNS:packet writer failure
- ORA-03114: not connected to ORACLE

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

Practices for Lesson 11: Implementing Oracle Database Auditing

Chapter 11

Practices for Lesson 11: Overview

Practices Overview

In the practices for this lesson, you will:

- Enable unified audit
- Create audit users
- Create an audit policy
- Assign the audit policy to multiple users
- Change an audited table
- Review audit trail data in the `UNIFIED_AUDIT_TRAIL` view
- Maintain the audit trail

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 auditing and monitor data manipulation language (DML) activities in this table.

Practice 11-1: Enabling Unified Auditing

Overview

In this practice, you enable unified auditing.

Tasks

1. Shut down all Oracle processes of all instances.
 - a. Shut down the listener.

```
$ . oraenv
[ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

```
$ lsnrctl stop
LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 13-OCT-
2014 13:03:00

Copyright (c) 1991, 2014, Oracle. All rights reserved.

Connecting to
(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=ed.us.oracle.com)(PORT=
=1521)))
The command completed successfully
```

- b. Shut down all instances.

```
$ pgrep -lf pmon
6871 ora_pmon_em12rep
28985 ora_pmon_orcl
$
```

- 1) Shut down the `orcl` instance.

```
$ sqlplus / as sysdba
...
Connected to:
...
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> EXIT
Disconnected ...
```

- 2) Shut down the `em12rep` instance.

- a) Stop the OMS.

```
$ cd /u01/app/oracle/product/middleware/oms  
$ export OMS_HOME=/u01/app/oracle/product/middleware/oms  
  
$ $OMS_HOME/bin/emctl stop oms  
Oracle Enterprise Manager Cloud Control 12c Release 4  
Copyright (c) 1996, 2014 Oracle Corporation. All rights  
reserved.  
Stopping WebTier...  
WebTier Successfully Stopped  
Stopping Oracle Management Server...  
Oracle Management Server Successfully Stopped  
Oracle Management Server is Down  
$
```

- b) Shut down em12rep, the repository database instance.

```
$ . oraenv  
[ORACLE_SID = [orcl] ? em12rep  
The Oracle base for  
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is  
/u01/app/oracle
```

```
$ sqlplus / as sysdba  
...  
Connected to:  
...  
SQL> shutdown immediate  
Database closed.  
Database dismounted.  
ORACLE instance shut down.  
SQL> EXIT  
Disconnected ...  
$
```

- 3) Verify that all instances are down.

```
$ pgrep -lf pmon  
$
```

2. Enable the unified auditing feature.

```
$ cd $ORACLE_HOME/rdbms/lib  
$ make -f ins_rdbms.mk uniaud_on ioracle  
/usr/bin/ar d  
/u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/libknlopt.a  
kzanolang.o  
/usr/bin/ar cr  
/u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/libknlopt.a  
/u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/kzaolang.o
```

```
chmod 755 /u01/app/oracle/product/12.1.0/dbhome_1/bin  
  
- Linking Oracle  
rm -f /u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/oracle  
/u01/app/oracle/product/12.1.0/dbhome_1/bin/orald -o  
/u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/oracle -m64 -z  
noexecstack -  
...  
mv /u01/app/oracle/product/12.1.0/dbhome_1/rdbms/lib/oracle  
/u01/app/oracle/product/12.1.0/dbhome_1/bin/oracle  
chmod 6751 /u01/app/oracle/product/12.1.0/dbhome_1/bin/oracle  
$
```

3. Restart the processes.

a. Restart the listener.

```
$ lsnrctl start  
LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 13-OCT-  
2014 13:16:19  
  
Copyright (c) 1991, 2014, Oracle. All rights reserved.  
  
Starting /u01/app/oracle/product/12.1.0/dbhome_1/bin/tnslsnr:  
please wait...  
  
TNSLSNR for Linux: Version 12.1.0.2.0 - Production  
System parameter file is  
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.o  
ra  
Log messages written to  
/u01/app/oracle/diag/tnslsnr/EDP1/listener/alert/log.xml  
Listening on:  
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp) (HOST=edp1.us.oracle.com) (PO  
RT=1521)))  
Listening on:  
(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc) (KEY=EXTPROC1521)))  
  
Connecting to  
(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP) (HOST=edp1.us.oracle.com) (PO  
RT=1521)))  
STATUS of the LISTENER  
-----  
Alias LISTENER  
Version TNSLSNR for Linux: Version 12.1.0.2.0  
- Production  
Start Date 13-OCT-2014 13:16:20  
Uptime 0 days 0 hr. 0 min. 0 sec
```

```
Trace Level          off
Security           ON: Local OS Authentication
SNMP              OFF
Listener Parameter File
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.ora
Listener Log File
/u01/app/oracle/diag/tnslsnr/EDRSR9P1/listener/alert/log.xml
Listening Endpoints Summary...

(DESCRIPTION= (ADDRESS= (PROTOCOL=tcp) (HOST=edp1.us.oracle.com) (PORT=1521)))
(DESCRIPTION= (ADDRESS= (PROTOCOL=ipc) (KEY=EXTPROC1521)))
The listener supports no services
The command completed successfully
$
```

- b. Restart the orcl database instance.

```
$ . oraenv
[ORACLE_SID = [em12rep] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle

$ sqlplus / as sysdba
...
Connected to an idle instance.

SQL> startup
ORACLE instance started.

Total System Global Area 503316480 bytes
Fixed Size            2926080 bytes
Variable Size         268438016 bytes
Database Buffers     226492416 bytes
Redo Buffers          5459968 bytes
Database mounted.
Database opened.
```

- c. Check that unified auditing is enabled.

```
SQL> SELECT value FROM v$option
2> where parameter = 'Unified Auditing';

VALUE
-----
```

```
TRUE

SQL> EXIT

Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics, Real
Application Testing and Unified Auditing options
$
```

You can also see that the Unified Auditing feature is enabled by checking the SQL*Plus banner.

- d. Start the Enterprise Manager repository instance, em12rep.

```
$ . oraenv
ORACLE_SID = [orcl] ? em12rep
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
[oracle@EDRSR32P1 ~]$ sqlplus / as sysdba
...
Connected to:
...
SQL> startup
ORACLE instance started.

Total System Global Area 503316480 bytes
Fixed Size                  2926080 bytes
Variable Size                268438016 bytes
Database Buffers              226492416 bytes
Redo Buffers                  5459968 bytes
Database mounted.
Database opened.
SQL> exit
```

- e. Start the OMS. Note that this command can take 10 minutes or so to complete.

```
$ /u01/app/oracle/product/middleware/oms/bin/emctl start oms
Oracle Enterprise Manager Cloud Control 12c Release 4
Copyright (c) 1996, 2014 Oracle Corporation. All rights
reserved.

Starting Oracle Management Server...
Starting WebTier...
WebTier Successfully Started
Oracle Management Server Successfully Started
Oracle Management Server is Up
$
```

Practice 11-2: Creating Audit Users

Overview

In this practice you will create audit users: one account to administer the audit settings and another account to be used by the external auditor. These additional users are optional, but are a good practice that provides a clear separation of duties required in many businesses.

Assumptions

Unified auditing has been enabled in the `orcl` database. Preferred `SYSDBA` credentials have been set.

Tasks

1. Create a database user to be the administrator of the audit settings and policies. Name this user `AUDMGR` with the password `oracle_4U`, and assign the `AUDIT_ADMIN` role to this user. Use Enterprise Manager Cloud Control to perform this task.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Login: User: ADMIN Password: oracle_4U
b.	Enterprise Summary	Navigate to the <code>orcl</code> database home page.
c.	orcl database home	Click Security > Users .
d.	Database Login	Select Credential: Preferred Preferred Credential Name SYSDBA Database Credentials Click Login .
e.	Users	Click Create .
f.	Create User :General tab	Enter Name: AUDMGR Password: oracle_4U Default Tablespace: SYSAUX Temporary Tablespace: TEMP Click the Roles tab.
g.	Create User :Roles tab	Click Edit List .
h.	Modify Roles	Select AUDIT_ADMIN . Move to Selected Roles . Click OK .
i.	Create User :Roles tab	Click Show SQL . Click Return .
j.	Create User :Roles tab	Click OK .
k.	Users	An update message is displayed.

2. Create a database user to be used by any person that needs to view the audit data. Name this user AUDVWR with the password oracle_4U and assign the AUDIT_VIEWER role to this user.
 - a. Repeat the steps in Task 1, using AUDVWR as the user name and specifying AUDIT_VIEWER as the role.
 - b. Copy and paste the SQL commands to the P11script.sql file. Save and close the file.

Practice 11-3: Creating an Audit Policy

Overview

In this practice, as the AUDMGR user you will create an audit policy to monitor activity in the HR.JOBS table and apply it to multiple users.

Assumptions

The AUDMGR user has been created. Several users with DML privileges on HR.JOBS have been created.

Tasks

1. Invoke SQL*Plus and connect to the orcl database as the AUDMGR user. Create a policy named JOBS_AUDIT_UPD that audits all auditable statements for the HR.JOBS table.
 - a. Set the environment for the orcl database by using oraenv.
 - b. Connect to the orcl database as the AUDMGR user by using SQL*Plus.

```
$ sqlplus audmgr  
Enter password: oracle_4U  
...  
SQL>
```

- c. Create an audit policy to track UPDATE commands issued against the HR.JOBS table.

```
SQL> CREATE AUDIT POLICY jobs_audit_upd  
2  ACTIONS update ON hr.jobs;  
  
Audit policy created.
```

- d. Verify the creation of the JOBS_AUDIT_UPD policy.

```
SQL> SELECT audit_option, audit_option_type, object_schema,  
object_name  
2  FROM audit_unified_policies  
3  WHERE policy_name = 'JOBS_AUDIT_UPD';  
  
AUDIT_OPTION    AUDIT_OPTION_TYPE    OBJECT_SCHEMA    OBJECT_NAME  
-----          -----          -----          -----  
UPDATE          OBJECT ACTION        HR             JOBS
```

Question: If you had multiple databases with the same users and data, such as a QA and development databases, how would you make sure that this policy is applied in all the databases?

Answer: There are two ways that have been shown: 1) Create a SQL script and run the script in the other databases. 2) Use Cloud Control to run in multiple databases. A third option is to re-create the other databases from the production database after the changes have been applied. This technique is out of the scope of this course.

2. Assign the policy to all users.

```
SQL> AUDIT POLICY jobs_audit_upd;
Audit succeeded.
```

3. View information about the audit policy.

```
SQL> column POLICY_NAME format A20
SQL> column USER_NAME format A20
SQL> SELECT policy_name, enabled_opt,
2> user_name, success, failure
3> FROM audit_unified_enabled_policies;

POLICY_NAME          ENABLED_  USER_NAME      SUC FAI
-----  -----  -----
ORA_SECURECONFIG      BY        ALL USERS    YES YES
ORA_LOGON_FAILURES   BY        ALL USERS    NO  YES
JOBS_AUDIT_UPD       BY        ALL USERS    YES YES

SQL>
```

4. Test the audit policy by connecting as a user that has privileges to update rows in the HR.JOB\$ table.

- a. Connect as the DHAMBY user and update MAX_SALARY of the President to \$50000.

```
SQL> connect DHAMBY
Enter password:
Connected.
SQL> desc hr.jobs
Name           Null?    Type
-----
JOB_ID         NOT NULL VARCHAR2(10)
JOB_TITLE      NOT NULL VARCHAR2(35)
MIN_SALARY     NUMBER(6)
MAX_SALARY     NUMBER(6)

SQL> select * from hr.jobs where job_title = 'President';

JOB_ID      JOB_TITLE          MIN_SALARY MAX_SALARY
-----  -----
AD_PRES     President        20080      40000

SQL> update hr.jobs set max_salary = 50000
2> where JOB_ID = 'AD_PRES';

1 row updated.
```

```
SQL> exit
```

- b. Connect as the AUDMGR user and view the audit trail records for this change.
Note: Your output may vary from what is shown depending on how many times you have logged on and logged off as the DHAMBY user. For this practice, you are interested in the row for the JOBS_AUDIT_UPD policy.

```
$ sqlplus audmgr
Enter password:
SQL> col unified_audit_policies format a25
SQL> col action_name format a10
SQL> col object_schema format a10
SQL> col object_name format a10
SQL> select unified_audit_policies, action_name,
2    object_schema, object_name
3  from unified_audit_trail
4 where dbusername = 'DHAMBY';

UNIFIED_AUDIT_POLICIES      ACTION_NAM OBJECT_SCH OBJECT_NAM
-----
JOBS_AUDIT_UPD                UPDATE        HR          JOBS
ORA_SECURECONFIG               LOGON
```

- c. If you did not see any rows as a result of the query in step 4b, flush the audit records.

Note: The default behavior of the Unified Audit Engine is to queue the audit records and write them to the Unified Audit trail as the queue fills. The DBMS_AUDIT_MGMT.FLUSH_UNIFIED_AUDIT_TRAIL procedure forces the records in the queue to be written to disk. The audit records are not visible until they are written to the audit trail.

```
SQL> EXEC DBMS_AUDIT_MGMT.FLUSH_UNIFIED_AUDIT_TRAIL;
PL/SQL procedure successfully completed.

SQL>
```

- d. View the audit trail records.

```
SQL> select unified_audit_policies, action_name,
  2  object_schema, object_name
  3  from unified_audit_trail
  4  where dbusername = 'DHAMBY';

UNIFIED_AUDIT_POLICIES      ACTION_NAM OBJECT_SCH OBJECT_NAM
-----  -----  -----
JOBS_AUDIT_UPD              UPDATE    HR        JOBS
ORA_SECURECONFIG             LOGON
ORA_SECURECONFIG             LOGON
ORA_SECURECONFIG             LOGOFF
```


Practices for Lesson 12: Backup and Recovery: Concepts

Chapter 12

Practices for Lesson 12

There are no practices for this lesson.

Practices for Lesson 13: Backup and Recovery: Configuration

Chapter 13

Practices for Lesson 13: Overview

Practices Overview

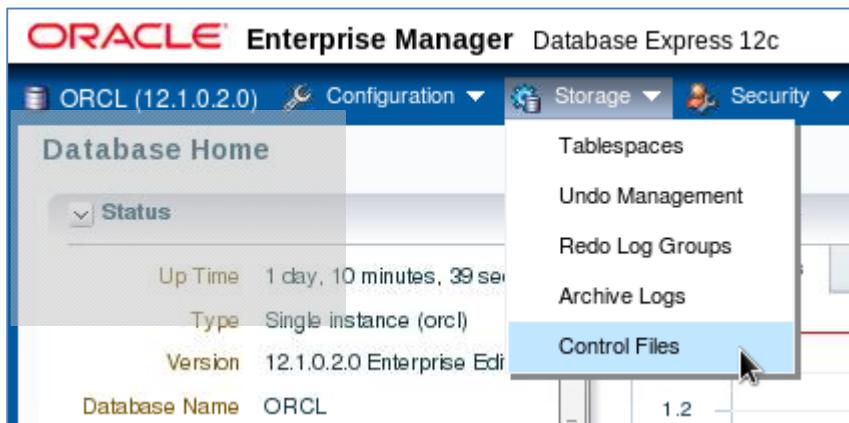
Configure your database to reduce the chances of failure or data loss. To do so, perform the following tasks:

- Ensure redundancy of control files.
- 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 13-1: Configuring Your Database for Recovery

In this practice, you verify that your database is configured properly to support recovery operations in the event of a failure.

1. Verify that the control files are multiplexed.
 - a. Launch Enterprise Manager Database Express. Log in as the DBA1 user.
 - b. Click **Storage > Control Files**.

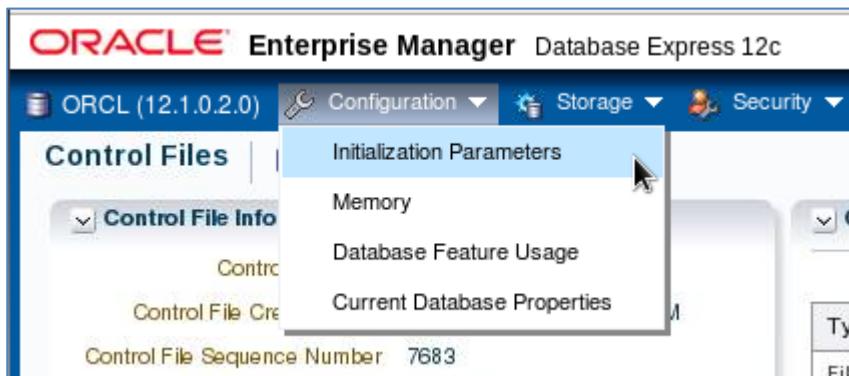


Question 1: On the Control Files: List of Control Files page, how many control files do you have?

Answer: 2

File Na...	File Dir...	Created in Flash Re...	File Size
control02.c	/u01/ap...	No	10MB
control01.c	/u01/ap...	No	10MB

2. Review the fast recovery area configuration and change the size to 8 GB.
 - a. In Enterprise Manager Database Express, select **Configuration > Initialization Parameters**.



- b. View the values of the initialization parameters in the “Archiving and Recovery” section that start with db_recovery_file.

The parameter values listed here are currently used by the running instance(s).							
View ▾		Set...	Help	Modify			
Name	Value	Comment	Modi...	Dyn...	Sess...	Basic	
Ansi Compliance							
blank_trimming	false						
Archiving and Recovery							
control_file_record_keep_time	7						✓
db_create_online_log_dest_1					✓	✓	✓
db_create_online_log_dest_2					✓	✓	✓
db_create_online_log_dest_3					✓	✓	✓
db_create_online_log_dest_4					✓	✓	✓
db_create_online_log_dest_5					✓	✓	✓
db_recovery_file_dest	/u01/app/oracle/fast_r...		✓	✓			✓
db_recovery_file_dest_size	4560M		✓	✓			✓
db_unrecoverable_scn_tracking	true		✓	✓			✓
fast_start_io_target	0		✓				

Question: Is the fast recovery area enabled?

Answer: Yes, because the db_recovery_file_dest and db_recovery_file_dest_size parameters values are not null.

- c. Note the location of the fast recovery area.

For example: /u01/app/oracle/fast_recovery_area

- d. **Question:** Which essential DBA tasks can you perform in this section?

Answer: You can change the location and size for the fast recovery area.

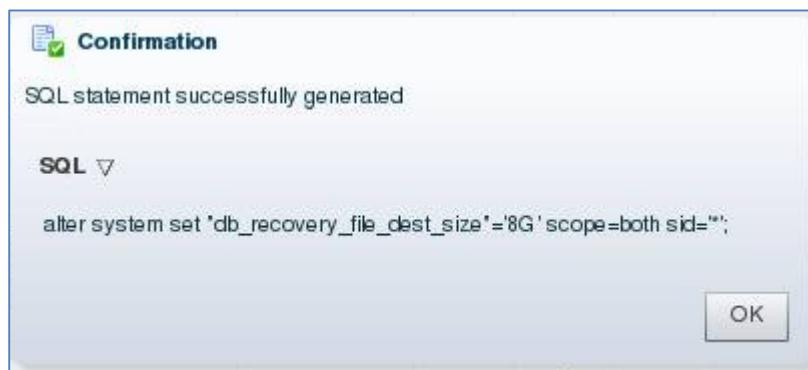
- e. **Question:** Does changing the size of the fast recovery area require the database to be restarted?

Answer: No, a restart is not required for this change, because this is a dynamic parameter. This is indicated by the check in the Dynamic column.

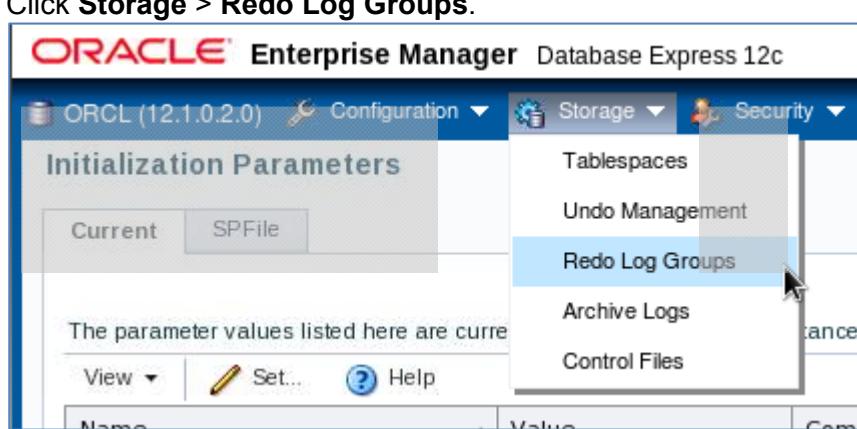
- f. Change the size of the Fast Recovery Area to **8 GB**, by selecting the parameter and clicking **Set**. Then enter **8G** in the “Value” field of the Set Initialization Parameter page.



- g. Optionally, click **Show SQL**, review the statement, and click **OK**.



- h. In the Set Initialization Parameter box, click **OK**.
i. A Confirmation message is returned. Click **OK**.
3. 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 **Storage > Redo Log Groups**.



- b. Note how many members are in the “Member Count” column. There is only one member in each group.

Name	Status	Member ...	Archived	Size	Sequence	First Change Nu...	File Dire...
Redo Log Group 1	Inactive	1		50MB 50MB	64	2572748	/u01/app/...
Redo Log Group 2	Inactive	1		50MB 50MB	65	2581049	/u01/app/...
Redo Log Group 3	Current	1		50MB 50MB	66	2606522	/u01/app/...

- c. Select one of your redo log groups and click “Add Member...” to add another member to the Redo Log Group.

Name	Status	Member ...	Archived	Size
Redo Log Group 1	Inactive	1		50MB 50MB
Redo Log Group 2	Inactive	1		50MB 50MB
Redo Log Group 3	Current	1		50MB 50MB

- d. Enter `redonnb.log` in the File Name field where `nn` represents the redo log group number.

Add Member

Group # 1

File Directory * /u01/app/oracle/oradata/orcl/

File Name * redo01b.log

File Size 50M

Show SQL OK Cancel

- e. You can click **Show SQL** to view the SQL statement. Click **OK**.



- f. A Confirmation message is returned. Click **OK**.
g. Now, you can see that the “**Member Count**” column shows 2 for one of the redo log groups.

Redo Log Groups					
Name	Status	Member ...	Archived	Size	
└ Redo Log Group 1	Inactive	2		100MB	
└ redo01.log				50MB	
└ redo01b.log				50MB	
└ Redo Log Group 2	Inactive	1		50MB	
└ redo02.log				50MB	
└ Redo Log Group 3	Current	1		50MB	
└ redo03.log				50MB	

- h. Repeat steps c, d, and e to add another member to the other two redo log groups. After repeating these steps, you should have two members in each redo log group.

Redo Log Groups							Page Refreshed 1:53:471	
Name	Status	Member ...	Archived	Size	Sequence	First Change Nu...	Name	
└ Redo Log Group 1	Inactive	2		100MB	64	2572748		
└ redo01.log				50MB				
└ redo01b.log				50MB				
└ Redo Log Group 2	Inactive	2		100MB	65	2581049		
└ redo02.log				50MB				
└ redo02b.log				50MB				
└ Redo Log Group 3	Current	2		100MB	66	2606522		
└ redo03.log				50MB				
└ redo03b.log				50MB				

- i. Log out of Enterprise Manager Database Express.

4. You notice that for each redo log group, the “Archived” column has no value. 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.

You do not need to specify a naming convention or a destination for the archived redo log files because you are using a fast recovery area.

Note: If you add archive log destinations, you must create the directory if it does not already exist.

Use SQL*Plus to set the database in ARCHIVELOG mode.

- a. Open a terminal window and set the environment for the `orcl` database.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

- b. Invoke SQL*Plus and log in as SYSDBA.

```
$ sqlplus / AS SYSDBA
...
Connected to:
...
SQL>
```

- c. Shut down the instance.

```
SQL> SHUTDOWN IMMEDIATE
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL>
```

- d. Start the database in MOUNT mode.

```
SQL> STARTUP MOUNT
ORACLE instance started.
Total System Global Area 503316480 bytes
Fixed Size                  2926080 bytes
Variable Size                268438016 bytes
Database Buffers              226492416 bytes
Redo Buffers                  5459968 bytes
Database mounted.

SQL>
```

- e. Set the mode to ARCHIVELOG.

```
SQL> ALTER DATABASE ARCHIVELOG;
```

Database altered.

```
SQL>
```

- f. Open the database.

```
SQL> ALTER DATABASE OPEN;
```

Database altered.

```
SQL>
```

- g. Shut down the database instance.

```
SQL> SHUTDOWN IMMEDIATE
```

Database closed.

Database dismounted.

ORACLE instance shut down.

```
SQL>
```

- h. Start the database instance again. Once your database has restarted, use the **ARCHIVE LOG LIST** command to verify that the database is in ARCHIVELOG mode. Exit from SQL*Plus.

```
SQL> STARTUP
```

ORACLE instance started.

Total System Global Area 503316480 bytes

Fixed Size 2926080 bytes

Variable Size 268438016 bytes

Database Buffers 226492416 bytes

Redo Buffers 5459968 bytes

Database mounted.

Database opened.

```
SQL> archive log list
```

Database log mode Archive Mode

Automatic archival Enabled

Archive destination USE_DB_RECOVERY_FILE_DEST

Oldest online log sequence 594

Next log sequence to archive 596

Current log sequence 596

```
SQL> EXIT
```

Disconnected ...

```
$
```

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.

5. Configure redundant archive log destinations.

- a. Create a new directory named /u01/app/oracle/oradata/orcl/archive_dir2 by executing the `mkdir` command at the operating system prompt.

```
$ mkdir /u01/app/oracle/oradata/orcl/archive_dir2  
$
```

- b. Set the `LOG_ARCHIVE_DEST_1` parameter to the FRA destination and the `LOG_ARCHIVE_DEST_2` parameter to the new directory.

```
$ sqlplus / as sysdba  
...  
Connected to:  
...  
SQL> ALTER SYSTEM SET  
log_archive_dest_1='LOCATION=/u01/app/oracle/fast_recovery_area/  
ORCL/archivelog' SCOPE=both;  
  
System altered.  
SQL> ALTER SYSTEM SET  
log_archive_dest_2='LOCATION=/u01/app/oracle/oradata/orcl/archiv  
e_dir2' SCOPE=both;  
  
System altered.  
SQL>
```

- c. Perform a few log switches. Verify that archive logs are created in both destinations by querying `V$ARCHIVED_LOG`. Exit from SQL*Plus.

```
SQL> ALTER SYSTEM SWITCH LOGFILE;  
  
System altered.  
  
SQL> ALTER SYSTEM SWITCH LOGFILE;  
  
System altered.  
  
SQL> ALTER SYSTEM SWITCH LOGFILE;  
  
System altered.  
  
SQL> SELECT name FROM v$archived_log ORDER BY stamp;  
  
NAME  
-----
```

```
/u01/app/oracle/fast_recovery_area/ORCL/archivelog/1_30_80122835  
5.dbf  
/u01/app/oracle/oradata/orcl/archive_dir2/1_30_801228355.dbf  
/u01/app/oracle/fast_recovery_area/ORCL/archivelog/1_31_80122835  
5.dbf  
/u01/app/oracle/oradata/orcl/archive_dir2/1_31_801228355.dbf  
/u01/app/oracle/fast_recovery_area/ORCL/archivelog/1_32_80122835  
5.dbf  
/u01/app/oracle/oradata/orcl/archive_dir2/1_32_801228355.dbf  
  
6 rows selected.  
  
SQL> EXIT  
$
```


Practices for Lesson 14: Performing Database Backups

Chapter 14

Practices for Lesson 14: Overview

Practices Overview

In these practices, you will create backups of your database so that you can recover from various types of failures.

Practice 14-1: Backing Up the Control File

Overview

In this practice, you back up your control file to a trace file, creating a file of SQL commands that can be used to re-create the control file.

Assumptions

Practices for lesson 13 have been successfully completed.

Tasks

1. Launch Enterprise Manager Cloud Control and log in as the **ADMIN** user.
2. Navigate to the **orcl** database home page.
3. Select **Administration > Storage > Control Files**.
4. Log in to the **orcl** database with your named credential.
5. On the Control Files page, click **Backup to Trace**.

Valid	File Name	File Directory
VALID	control01.ctf	/u01/app/oracle/oradata/orcl/
VALID	control02.ctf	/u01/app/oracle/fast_recovery_area/orcl/

6. An update message is displayed. Click **OK**.
7. You can also perform a control file back up to trace by executing a SQL command. Log in to SQL*Plus as the **DBA1** user and execute the **ALTER DATABASE BACKUP CONTROLFILE TO TRACE** command. Exit from SQL*Plus.

```
SQL> alter database backup controlfile to trace;
Database altered.
SQL> exit
```

8. Navigate to the **/u01/app/oracle/diag/rdbms/orcl/orcl/trace** directory and view the end of the alert log to verify the creation of the trace files and the names of the files.

```
$ cd /u01/app/oracle/diag/rdbms/orcl/orcl/trace
[trace]$ tail alert_orcl.log
Wed Oct 15 12:43:15 2014
ALTER DATABASE BACKUP CONTROLFILE TO TRACE
Wed Oct 15 12:43:15 2014
Backup controlfile written to trace file
/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_21975.trc
Completed: ALTER DATABASE BACKUP CONTROLFILE TO TRACE
Wed Oct 15 12:47:30 2014
alter database backup controlfile to trace
Wed Oct 15 12:47:30 2014
```

```
Backup controlfile written to trace file  
/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_22528.trc  
Completed: alter database backup controlfile to trace
```

Practice 14-2: Configuring Automatic Backups of the Control File and SPFILE

Overview

In this practice you configure automatic backups of the control file and server parameter file (SPFILE) when a backup of the database is made and when there is a structural change to the database.

Tasks

1. Return to the `orcl` database home page in Enterprise Manager Cloud Control.
2. Select **Availability > Backup & Recovery > Backup Settings**.

The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface. The top navigation bar includes links for Enterprise, Targets, Favorites, and History. Below the navigation bar, the database name `orcl` is displayed, along with tabs for Oracle Database, Performance, Availability (which is selected), Security, Schema, and Administration. A dropdown menu from the Availability tab shows options: High Availability Console, MAA Advisor, Backup & Recovery (which is selected and highlighted in yellow), and Add Standby Database... A secondary dropdown menu for Backup & Recovery lists several options: Schedule Backup..., Manage Current Backups, Backup Reports, Restore Points, Perform Recovery..., Transactions, Backup Settings (which is selected and highlighted in yellow), Recovery Settings, and Recovery Catalog Settings. The main content area displays sections for Control Files and Control File Mirror Images, with a table showing two valid control files: control01.ctl and control02.ctl.

3. On the Backup Settings page, click the **Policy** tab.
4. Select “Automatically backup the control file and server parameter file (SPFILE) with every backup and database structural change.”

The screenshot shows the Backup Settings page. The top navigation bar is identical to the previous screenshot. The main content area has a tab bar with Device, Backup Set, and Policy (which is selected). Below the tab bar is a section titled "Backup Policy" containing a single checkbox: "Automatically backup the control file and server parameter file (SPFILE) with every backup and database structural change". This checkbox is checked. Below the checkbox is a section titled "Autobackup Disk Location" with a text input field and a descriptive note: "An existing directory or diskgroup name where the control file and server parameter file will be backed up, backed up to the fast recovery area location."

5. Scroll to the bottom of the page. In the Host Credentials section, select **New**. Enter **oracle** in the User Name field. Enter your OS password in the Password and Confirm Password fields. Click **Test** to ensure that you entered the values properly.

Host Credentials

Supply operating system login credentials to access the target database.

Credential Named New

* UserName

* Password

* Confirm Password

Save As NC_ORCL_2014-10-15-130428

Set As Preferred Credentials

Test

6. Click **Apply**.

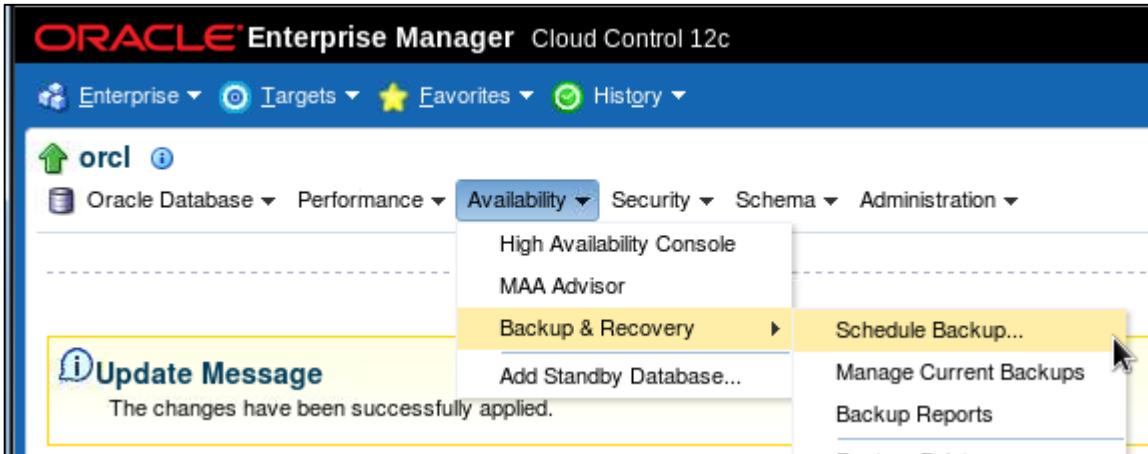
Practice 14-3: Creating a Whole Database Backup

Overview

In this practice, you back up your entire database, including the archived redo log files. The backup should be the base for an incremental backup strategy.

Tasks

1. In Enterprise Manager Cloud Control, select **Availability > Backup & Recovery > Schedule Backup**.



2. In the Customized Backup section, select **Whole Database**. Confirm that the host credentials are set with oracle as the user name and password. Click **Schedule Customized Backup**.

The screenshot shows the 'Schedule Backup' page. At the top, there's a message: 'Oracle provides an automated backup strategy based on your disk and/or tape configuration. Alternatively, you can choose to create a customized backup.' Below this is the 'Oracle-Suggested Backup' section, which says 'Schedule a backup using Oracle's automated backup strategy.' and 'This option will back up the entire database. The database will be backed up on daily and weekly intervals.' To the right is a button 'Schedule Oracle-Suggested Backup'. Below this is the 'Customized Backup' section, which says 'Select the object(s) you want to back up.' and has a list of options: 'Whole Database' (radio button selected), 'Tablespaces', 'Datafiles', 'Archived Logs', and 'All Recovery Files on Disk'. A note below says 'Includes all archived logs and disk backups that are not already backed up to tape.' To the right is a button 'Schedule Customized Backup'.

3. In the Backup Type section, select **Full Backup** and “**Use as the base of an incremental backup strategy**.”
4. In the Backup Mode section, select **Online Backup**.

5. 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.” Click Next.

Schedule Customized Backup: Options

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Backup Type

Full Backup
 Use as the base of an incremental backup strategy
 Incremental Backup
A level 1 cumulative incremental backup includes all blocks changed since the most recent level 0 backup.
 Refresh the latest datafile copy on disk to the current time using the incremental backup

Backup Mode

Online Backup
Can be performed when the database is open.
 Offline Backup
If the database is open at the time of backup, it will be shut down and mounted before the backup, then re-opened after the backup.

Advanced

Also back up all archived logs on disk
 Delete all archived logs from disk after they are successfully backed up
 Delete obsolete backups
Delete backups that are no longer required to satisfy the retention policy.
 Use proxy copy supported by media management software to perform a backup
If proxy copy of the selected files is not supported, a conventional backup will be performed.

6. On the Settings page, select **Disk** as the backup destination. Click **Next**.

Schedule Customized Backup: Settings

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Select the destination media for this backup. You can also override the default backup settings.

Disk
Disk Backup Location /u01/app/oracle/fast_recovery_area
 Tape
Media Management Vendor (MMV) Library Parameters Not specified

[View Default Settings](#) [Override Default Settings](#)
Changed settings will only apply to the current backup.

[Return to Schedule Backup](#)

7. On the Schedule page, accept the defaults. Click **Next**.

Schedule Customized Backup: Schedule

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Job

* Job Name **BACKUP_ORCL_000001**
Job Description **Whole Database Backup**

Schedule

Type One Time (Immediately) One Time (Later) Repeating

[Return to Schedule Backup](#)

8. On the Review page, review the RMAN script and then click **Submit Job**.

Schedule Customized Backup: Review

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Settings

Destination **Disk**
Backup Type **Use as the base of an incremental backup strategy**
Backup Mode **Online Backup**
Fast Recovery Area **/u01/app/oracle/fast_recovery_area**

RMAN Script

The RMAN script below is generated based on previous input.

```
backup incremental level 0 cumulative device type disk tag '%TAG' database;
backup device type disk tag '%TAG' archivelog all not backed up delete all input;
```

[Return to Schedule Backup](#)

9. A confirmation message is displayed. Click **View Job**.

10. Click the Refresh icon on the right side of page until you see that the job has completed successfully.

Job Activity > Execution: orcl

Execution: orcl

Page Refreshed Oct 15, 2014 1:19:26 PM UTC

Summary

Status Succeeded
 Scheduled Oct 15, 2014 1:14:52 PM GMT+00:00
 Started Oct 15, 2014 1:14:55 PM GMT+00:00
 Ended Oct 15, 2014 1:19:11 PM GMT+00:00
 Elapsed Time 4 minutes, 16 seconds

Type Database Backup
 Owner ADMIN
 Description Whole Database Backup
 Execution ID 0576EAD394B26205E0536D23B98BBB00
 Backup Strategy advanced
 Version 10g or higher YES
 Database Connect String (DESCRIPTION=(ADDRESS_LIST=(ADDR...
 Database Name ORCL
 Blackout NO
 Encryption Mode None
 Offline Backup NO
 Oracle Home /u01/app/oracle/product/12.1.0/d...
 Oracle SID orcl
 Backup Script Show
 dbCreds NC_ORCL_2014-10-09-100609 (dba1/*********)
 hostCreds NC_ORCL_2014-10-15-130428 (oracle/*********)

Targets
 Status All

[Expand All](#) | [Collapse All](#)

Name	Targets	Status	Started	Ended	Elapsed Time
Execution: orcl	orcl	Succeeded	Oct 15, 2014 1:14:55 PM GMT+00:00	Oct 15, 2014 1:19:11 PM GMT+00:00	4.3 minutes
Step: Pre-Backup	orcl	Succeeded	Oct 15, 2014 1:14:55 PM GMT+00:00	Oct 15, 2014 1:15:00 PM GMT+00:00	5 seconds
Step: Backup	orcl	Succeeded	Oct 15, 2014 1:15:02 PM GMT+00:00	Oct 15, 2014 1:19:06 PM GMT+00:00	4.1 minutes
Step: Post-Backup	orcl	Succeeded	Oct 15, 2014 1:19:07 PM GMT+00:00	Oct 15, 2014 1:19:11 PM GMT+00:00	4 seconds

Actions

Practices for Lesson 15: Performing Database Recovery

Chapter 15

Practices for Lesson 15: Overview

Practices Overview

In these practices, you will use the Data Recovery Advisor to recover a lost data file.

Practice 15-1: Recovering from the Loss of a Data File

Overview

In this practice, you recover from the loss of a data file belonging to the EXAMPLE tablespace.

Tasks

1. Log in to SQL*Plus as the `HR` user and query the `REGIONS` table.

```
$ sqlplus hr
Enter password:
SQL> SELECT * FROM regions;

REGION_ID REGION_NAME
-----
1 Europe
2 Americas
3 Asia
4 Middle East and Africa
```

2. Now connect as the `DBA1` user using the `SYSDBA` role.

```
SQL> connect dba1 as sysdba
Enter password:
Connected.
SQL>
```

3. Execute the `$LABS/P15/lab_15_01_03.sql` script to create a procedure that will be used later in this practice.

```
SQL> @$LABS/P15/lab_15_01_03
Connected.

Java created.
Procedure created.
PL/SQL procedure successfully completed.
...
Grant succeeded.

SQL>
```

4. Execute the `$LABS/P15/lab_15_01_04.sql` script. This script simulates a failure in the database environment by deleting a data file.

```
SQL> @$LABS/P15/lab_15_01_04

PL/SQL procedure successfully completed.

"Data file deleted. Wait a couple minutes before proceeding."
"Database should be open."
Disconnected...
$
```

5. Invoke SQL*Plus again and log in as the `HR` user. Again query the `REGIONS` table.

```
$ sqlplus hr
Enter password:

SQL> select * from hr.regions;
select * from hr.regions
*
ERROR at line 1:
ORA-01116: error in opening database file 5
ORA-01110: data file 5:
'/u01/app/oracle/oradata/orcl/example01.dbf'
ORA-27041: unable to open file
Linux-x86_64 Error: 2: No such file or directory
Additional information: 3

SQL>
```

6. Use Enterprise Manager Cloud Control to troubleshoot the error and recover the data file.

- Launch Enterprise Manager Cloud Control and log in as the `ADMIN` user.
- Navigate to the `orcl` database home page.
- Log in with your saved database credentials.
- Expand **Oracle Database**. Select **Monitoring > Incident Manager**. Note that there is a critical error listed, indicating a data failure.

All open incidents								
	Actions		View	View search criteria	Acknowledge	Clear ...		
Severity	Summary	Target	Priority	Status	Last Updated	Owner	Ackno	Escala
problems	Checker run found 1 new persistent data failures.	orcl	None	New	Oct 16, 2014 7:02:08...	-	No	Incident

- Expand **Availability**. Select **Backup & Recovery > Perform Recovery**.
- Specify a named host credential, or enter `oracle` as the username and your OS password in the password fields. Click **Continue**.

- g. Click the “Database Failures” link.

The screenshot shows the Oracle Data Recovery Advisor interface. A red box highlights the "Database Failures - 1" link under the "Perform Recovery" section. The "Oracle Advised Recovery" section indicates one failure has been detected. The "User Directed Recovery" section allows the user to choose a recovery scope (Whole Database) and operation type (Recover to current time, Restore all datafiles, or Recover from previously restored datafiles). The "Decrypt Backups" section shows host credentials for connecting to the target database, including a credential name and details for the "UserName" and "Password".

[Database Failures - 1](#)

Perform Recovery

Oracle Advised Recovery

The Data Recovery Advisor has detected failures. Click on "Advise and Recover" to have Oracle analyze and produce recovery advice.

[Advise and Recover](#)

Failures Detected Critical: 0 High: 1 Low: 0
Failure Description One or more non-system datafiles are missing

User Directed Recovery

Recovery Scope Whole Database ▾ [Recover](#)

Operation Type Recover to the current time or a previous point-in-time
Datafiles will be restored from the latest usable backup as required.
 Restore all datafiles
Specify Time, SCN or log sequence. The backup taken at or prior to that time will be used. No recovery will be performed in this operation.
 Recover from previously restored datafiles

Decrypt Backups

Host Credentials

Supply operating system login credentials to access the target database.

Credential Named New

Credential Name	NC_ORCL_2014-10-15-130428 ▾
Attribute	Value
Credential Details	UserName oracle
	Password *****

[More Details](#)

- h. View the failure information. Click **Advise**.

View and Manage Failures

Last Refresh October 16, 2014 7:10:13 AM UTC 

Select dropdown values and optionally enter failure description and impact strings to filter the data that is displayed in your results set.

Failure Description	Impact	Priority	Status	Time Detected
		CRITICAL or HIGH	OPEN	All

Select failures and .. **Advise** **Close** **Set Priority High** **Set Priority Low**

[Select All](#) | [Select None](#) | [Expand All](#) | [Collapse All](#)

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	2014-10-16 06:58:26.0

 **TIP** All CRITICAL failures must be selected before "Advise". All CRITICAL failures must be unselected before "Set Priority High" or "Set Priority Low".

- i. Click "Continue with Advise."

Manual Actions

Cancel **Re-assess Failures** **Continue with Advise** 

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/example01.dbf was unintentionally renamed or moved, restore it

- j. Review the RMAN script that will be used to restore the file and perform recovery. Click **Continue**.

Recovery Advice

The repair includes complete media recovery with no data loss

RMAN Script

```
# restore and recover datafile
sql 'alter database datafile 5 offline';
restore ( datafile 5 );
recover datafile 5;
sql 'alter database datafile 5 online';
```

- k. Review the information, and then click “**Submit Recovery Job**.”

The repair includes complete media recovery with no data loss

Failure Description

Failure Description	Impact	Priority
▽ Failures That Will Be Resolved		
▷ One or more non-system datafiles are missing	See impact for individual child failures	HIGH

RMAN Script

```
# restore and recover datafile
sql 'alter database datafile 5 offline';
restore ( datafile 5 );
recover datafile 5;
sql 'alter database datafile 5 online';
```

- l. A processing page appears, and then the Job Activity page appears. Click the job name link.

Job Activity

Confirmation

The job was created successfully

RECOVERY_ORCL_000022

- m. On the Job Run page, verify that the status is “Succeeded.” Then return to the `orcl` database home page.

Job Run: RECOVERY_ORCL_000022

Summary

Status	Succeeded
Scheduled	Oct 16, 2014 7:16:43 AM GMT+00:00
Started	Oct 16, 2014 7:16:46 AM GMT+00:00
Ended	Oct 16, 2014 7:18:22 AM GMT+00:00
Elapsed Time	1 minutes, 35 seconds

Details

Type	Database Recovery
Owner	ADMIN
Description	Recovery Job:
Execution ID	058607D5EA940D7FE0536D23B98BC231
Database Connect String	(DESCRIPTION=(ADDRESS_LIST=(ADDR...))
Database Name	ORCL
Oracle Home	/u01/app/oracle/product/12.1.0/d...
Oracle SID	orcl
Recovery Script	Show
Run State	UNKNOWN
dbCreds	NC_ORCL_2014-10-09-100609 (dba1/*********)
hostCreds	NC_ORCL_2014-10-15-130428 (oracle/*********)

- n. Return to your SQL*Plus session. Once again query the `HR. REGIONS` table to verify that the data file has been restored and recovered. Exit from SQL*Plus.

```
SQL> select * from hr.regions;

REGION_ID REGION_NAME
-----
1 Europe
2 Americas
3 Asia
4 Middle East and Africa
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics, Real
Application Testing and Unified Auditing options
$
```

- o. Return to Enterprise Manager Cloud Control. Expand **Oracle Database**. Select **Monitoring > Incident Manager**. Select the data failure incident and click **Clear**.

The screenshot shows the 'All open incidents' page in Oracle Enterprise Manager. At the top, there are search and filter options. Below that is a table with columns: Severity, Summary, Target, Priority, Status, and Last Updated. One row is visible, showing a severity of 'Problem', a summary message 'Checker run found 1 new persistent data failures.', a target of 'orcl', a priority of 'None', a status of 'New', and a last updated date of 'Oct 16, 2014 7:02...'. The 'Clear ...' button is highlighted with a red box.

Severity	Summary	Target	Priority	Status	Last Updated
Problem	Checker run found 1 new persistent data failures.	orcl	None	New	Oct 16, 2014 7:02...

- p. Select "Clear and do not send e-mail or page notifications." Click **OK** to confirm.
q. Return to the `orcl` database home page.

Practices for Lesson 16: Moving Data

Chapter 16

Practices for Lesson 16: Overview

Practices Overview

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 Data Pump export to export the `HR` schema to a 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 Data Pump import, remapping the `HR` schema to the `DBA1` schema.

Then you receive two data load requests for which you decide to use SQL*Loader.

Practice 16-1: Moving Data by 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. Be sure you know the OS directory where the Data Pump import file will be placed.

```
$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$ sqlplus / as sysdba

SQL> SELECT * from dbaDirectories
  2 WHERE directory_name = 'DATA_PUMP_DIR';

OWNER DIRECTORY_NAME DIRECTORY_PATH
-----
SYS    DATA_PUMP_DIR  /u01/app/oracle/admin/orcl/dpdump/
ORIGIN_CON_ID
-----
          0
SQL> grant read on directory data_pump_dir to dba1;

Grant succeeded.

SQL> grant write on directory data_pump_dir to dba1;

Grant succeeded.

SQL> exit
$
```

2. Use the Data Pump export utility to export the HR schema. Specify the DBA1 user to execute the export operation.

```
$ rm /u01/app/oracle/admin/orcl/dpdump/HREXP01.dmp
rm: cannot remove
`/u01/app/oracle/admin/orcl/dpdump/HREXP01.dmp': No such file or
directory
$ expdp dba1/oracle_4U dumpfile=HREXP%U.dmp
directory=DATA_PUMP_DIR logfile=hrexp.log SCHEMAS=HR
Export: Release 12.1.0.2.0 - Production on Thu Oct 16 10:39:28
2014

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Connected to: Oracle Database 12c Enterprise Edition Release
12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics, Real
Application Testing and Unified Auditing options
Starting "DBA1"."SYS_EXPORT_SCHEMA_01": dba1/*********
dumpfile=HREXP%U.dmp directory=DATA_PUMP_DIR logfile=hrexp.log
SCHEMAS=HR
Estimate in progress using BLOCKS method...
Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA
Total estimation using BLOCKS method: 448 KB
Processing object type SCHEMA_EXPORT/USER
Processing object type SCHEMA_EXPORT/SYSTEM_GRANT
Processing object type SCHEMA_EXPORT/ROLE_GRANT
Processing object type SCHEMA_EXPORT/DEFAULT_ROLE
Processing object type SCHEMA_EXPORT/PRE_SCHEMA/PROCACT_SCHEMA
Processing object type SCHEMA_EXPORT/SEQUENCE/SEQUENCE
Processing object type SCHEMA_EXPORT/TABLE/TABLE
Processing object type
SCHEMA_EXPORT/TABLE/GRANT/OWNER_GRANT/OBJECT_GRANT
Processing object type SCHEMA_EXPORT/TABLE/COMMENT
Processing object type SCHEMA_EXPORT/PROCEDURE/PROCEDURE
Processing object type SCHEMA_EXPORT/PROCEDURE/ALTER_PROCEDURE
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/VIEW/VIEW
Processing object type
SCHEMA_EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT
Processing object type SCHEMA_EXPORT/TABLE/TRIGGER
```

```

Processing object type SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS
Processing object type SCHEMA_EXPORT/STATISTICS/MARKER
. . . exported "HR"."COUNTRIES" 6.437
KB      25 rows
. . . exported "HR"."DEPARTMENTS" 7.101
KB      27 rows
. . . exported "HR"."EMPLOYEES" 17.06
KB      107 rows
. . . exported "HR"."JOBS" 7.085
KB      19 rows
. . . exported "HR"."JOB_HISTORY" 7.171
KB      10 rows
. . . exported "HR"."LOCATIONS" 8.414
KB      23 rows
. . . exported "HR"."REGIONS" 5.523
KB      4 rows
Master table "DBA1"."SYS_EXPORT_SCHEMA_01" successfully
loaded/unloaded
*****
Dump file set for DBA1.SYS_EXPORT_SCHEMA_01 is:
/u01/app/oracle/admin/orcl/dpdump/HREXP01.dmp
Job "DBA1"."SYS_EXPORT_SCHEMA_01" successfully completed at Thu
Oct 16 10:41:12 2014 elapsed 0 00:01:38
$
```

3. Now, import the **EMPLOYEES** table from the exported **HR** schema into the **DBA1** schema.
- a. 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
```

```
Import: Release 12.1.0.2.0 - Production on Thu Oct 16 10:46:14
2014
```

```
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rights reserved.
```

```
Connected to: Oracle Database 12c Enterprise Edition Release
12.1.0.2.0 - 64bit Production
```

```
With the Partitioning, OLAP, Advanced Analytics, Real
Application Testing and Unified Auditing 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"                                17.06
KB      107 rows
Processing object type
SCHEMA_EXPORT/TABLE/GRANT/OWNER_GRANT/OBJECT_GRANT
Processing object type SCHEMA_EXPORT/TABLE/COMMENT
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/CONSTRAINT/REF_CONSTRAINT
ORA-39083: Object type REF_CONSTRAINT:"DBA1"."EMP_DEPT_FK"
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
ORA-39083: Object type REF_CONSTRAINT:"DBA1"."EMP_JOB_FK" 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
Processing object type SCHEMA_EXPORT/TABLE/TRIGGER
Processing object type
SCHEMA_EXPORT/TABLE/STATISTICS(TABLE_STATISTICS
Processing object type SCHEMA_EXPORT/STATISTICS/MARKER
ORA-39082: Object type TRIGGER:"DBA1".UPDATE_JOB_HISTORY"
created with compilation warnings
ORA-39082: Object type TRIGGER:"DBA1".SECURE_EMPLOYEES" created
with compilation warnings
Job "DBA1"."SYS_IMPORT_TABLE_01" completed with 4 error(s) at
Thu Oct 16 10:46:49 2014 elapsed 0 00:00:34
$
```

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.

- b. You can also verify that the import succeeded by connecting as DBA1 and selecting data from the EMPLOYEES table.

```
$ sqlplus dba1/oracle_4U  
...  
SQL> SELECT count(*) FROM employees;  
  
COUNT (*)  
-----  
107  
  
SQL> exit  
$
```

Practice 16-2: Loading Data by Using SQL*Loader

In this practice, you load data into the PRODUCT_DESCRIPTIONS table by using SQL*Loader Express Mode. Data and control files are provided.

- As the OE user, use SQL*Loader to load the PRODUCT_DESCRIPTIONS table from the product_descriptions.dat data file in Express Mode.

Warning: DO NOT execute this SQL*Loader command a second time without first executing the cleanup script in step 3. Duplicate rows will be loaded and the Primary Key Index will become unusable.

- Ensure that you are accessing the orcl database.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1 is
/u01/app/oracle
$
```

- Ensure that the OE user is unlocked.

```
$ sqlplus dba1/oracle_4U

SQL> alter user oe identified by oracle_4U account unlock;

User altered.

SQL> exit
$
```

- Optionally, view the product_descriptions.dat file to learn more about its structure before going further. This file is in the \$LABS/P16 directory.

```
$ cd $LABS/P16
$ cat product_descriptions.dat
4001,ENG,Door,Outdoor
4002,FRE,Porte,Porte exterieure
4003,SPA,Puerta,Puerta exterior
4004,GER,Tur,Auberliche Tur
5001,ENG,Shutter,Outdoor shutter
5002,FRE,Volet,Volet exterieur
5003,SPA,Obturador,Obturador exterior
5004,GER,Fenster, Fensterladen
$
```

- d. Load the records in the product_descriptions.dat file into the OE.PRODUCT_DESCRIPTIONS table.

```
$ sqlldr oe/oracle_4U TABLE=product_descriptions

SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:07:22 2014

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rights reserved.

Express Mode Load, Table: PRODUCT_DESCRIPTIONS
Path used:      External Table, DEGREE_OF_PARALLELISM=AUTO
SQL*Loader-816: error creating temporary directory object
SYS_SQLLDR_XT_TMPDIR_00000 for file product_descriptions.dat
ORA-01031: insufficient privileges
SQL*Loader-579: switching to direct path for the load
SQL*Loader-583: ignoring trim setting with direct path, using
value of LDRTRIM
SQL*Loader-584: ignoring DEGREE_OF_PARALLELISM setting with
direct path, using value of NONE
Express Mode Load, Table: PRODUCT_DESCRIPTIONS
Path used:      Direct

Load completed - logical record count 8.

Table PRODUCT_DESCRIPTIONS:
  8 Rows successfully loaded.

Check the log file:
  product_descriptions.log
for more information about the load.
$
```

- e. Confirm your results by viewing the product_descriptions.log file in your \$LABS/P16 directory.

```
$ cat product_descriptions.log

SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:07:22 2014

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rights reserved.

Express Mode Load, Table: PRODUCT_DESCRIPTIONS
Data File:      product_descriptions.dat
```

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```
Bad File:      product_descriptions_%p.bad
Discard File:  none specified

(Allow all discards)

Number to load: ALL
Number to skip: 0
Errors allowed: 50
Continuation:   none specified
Path used:      External Table

Table PRODUCT_DESCRIPTIONS, loaded from every logical record.
Insert option in effect for this table: APPEND

Column Name          Position Len Term Encl Datatype
-----  -----  -----  -----  -----
PRODUCT_ID           FIRST    * ,     CHARACTER
LANGUAGE_ID          NEXT    * ,     CHARACTER
TRANSLATED_NAME      NEXT    * ,     CHARACTER
TRANSLATED_DESCRIPTION NEXT    * ,     CHARACTER

Generated control file for possible reuse:
OPTIONS (EXTERNAL_TABLE=EXECUTE, TRIM=LRTRIM)
LOAD DATA
INFILE 'product_descriptions'
APPEND
INTO TABLE PRODUCT_DESCRIPTIONS
FIELDS TERMINATED BY ","
(
  PRODUCT_ID,
  LANGUAGE_ID,
  TRANSLATED_NAME,
  TRANSLATED_DESCRIPTION CHAR(4000)
)
End of generated control file for possible reuse.

SQL*Loader-816: error creating temporary directory object
SYS_SQLLDR_XT_TMPDIR_00000 for file product_descriptions.dat
ORA-01031: insufficient privileges

-----
SQL*Loader-579: switching to direct path for the load
```

```
SQL*Loader-583: ignoring trim setting with direct path, using
value of LDRTRIM
SQL*Loader-584: ignoring DEGREE_OF_PARALLELISM setting with
direct path, using value of NONE
```

```
-----
Express Mode Load, Table: PRODUCT_DESCRIPTIONS
Data File:      product_descriptions.dat
Bad File:      product_descriptions.bad
Discard File:  none specified
```

```
(Allow all discards)
```

```
Number to load: ALL
Number to skip: 0
Errors allowed: 50
Continuation:   none specified
Path used:      Direct
```

```
Table PRODUCT_DESCRIPTIONS, loaded from every logical record.
Insert option in effect for this table: APPEND
```

Column Name Datatype	Position	Len	Term	Encl
PRODUCT_ID CHARACTER	FIRST	*	,	
LANGUAGE_ID CHARACTER	NEXT	*	,	
TRANSLATED_NAME CHARACTER	NEXT	*	,	
TRANSLATED_DESCRIPTION CHARACTER	NEXT	*	,	

```
Generated control file for possible reuse:
```

```
OPTIONS (DIRECT=TRUE)
LOAD DATA
INFILE 'product_descriptions'
APPEND
INTO TABLE PRODUCT_DESCRIPTIONS
FIELDS TERMINATED BY ","
(
    PRODUCT_ID,
    LANGUAGE_ID,
```

```
TRANSLATED_NAME,
TRANSLATED_DESCRIPTION CHAR(4000)
)

End of generated control file for possible reuse.

The following index(es) on table PRODUCT_DESCRIPTIONS were
processed:
index OE.PRD_DESC_PK loaded successfully with 8 keys
index OE.PROD_NAME_IX loaded successfully with 8 keys

Table PRODUCT_DESCRIPTIONS:
 8 Rows successfully loaded.
 0 Rows not loaded due to data errors.
 0 Rows not loaded because all WHEN clauses were failed.
 0 Rows not loaded because all fields were null.

Bind array size not used in direct path.
Column array rows :      5000
Stream buffer bytes: 256000
Read    buffer bytes: 1048576

Total logical records skipped:          0
Total logical records read:            8
Total logical records rejected:        0
Total logical records discarded:       0
Total stream buffers loaded by SQL*Loader main thread:      1
Total stream buffers loaded by SQL*Loader load thread:     0

Run began on Thu Oct 16 11:07:22 2014
Run ended on Thu Oct 16 11:07:26 2014

Elapsed time was:      00:00:04.17
CPU time was:          00:00:00.03
$
```

- f. Select the rows inserted in the OE.PRODUCT_DESCRIPTIONS table.

```
$ sqlplus oe/oracle_4U

SQL> SELECT * FROM PRODUCT_DESCRIPTIONS WHERE product_id > 4000;

PRODUCT_ID LAN TRANSLATED_NAME TRANSLATED_DESCRIPTION
-----
4001 ENG Door          Outdoor
```

```

4002 FRE Porte          Porte exterieure
4003 SPA Puerta         Puerta exterior
4004 GER Tur            Auberliche Tur
5001 ENG Shutter        Outdoor shutter
5002 FRE Volet          Volet exterieur
5003 SPA Obturador      Obturador exterior
5004 GER Fenster         Fensterladen

8 rows selected.

SQL> exit
$
```

2. As the **OE** user, load data into the **INVENTORIES** table by using SQL*Loader command line. The **lab_16_02_02.dat** data file contains rows of data for the **PRODUCT_ON_HAND** table. The **lab_16_02_02.ctl** file is the control file for this load. Optionally, view the **lab_16_02_02.dat** and **lab_16_02_02.ctl** files to learn more about their structure before going further.
 - a. Open a terminal window and navigate to the **\$LABS/P16** directory.
 - b. Ensure that your environment is configured for the **orcl** database by running **oraenv**.

```

$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/12.1.0/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=oe/oracle_4U control=lab_16_02_02.ctl
log=lab_16_02_02.log data=lab_16_02_02.dat
```

```

SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:14:25 2014
```

```

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rights reserved.
```

```
Path used:      Conventional
Commit point reached - logical record count 64
```

Table OE.INVENTORIES:

0 Rows successfully loaded.

Check the log file:

```
lab_16_02_02.log
for more information about the load.
$
```

You note that no rows were loaded. Read the log file.

```
$ cat lab_16_02_02.log
```

```
SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:14:25 2014
```

```
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```

```
Control File:    lab_16_02_02.ctl
Data File:      lab_16_02_02.dat
Bad File:       lab_16_02_02.bad
Discard File:   none specified
```

(Allow all discards)

```
Number to load: ALL
Number to skip: 0
Errors allowed: 50
Bind array:     64 rows, maximum of 256000 bytes
Continuation:   none specified
Path used:      Conventional
```

Table OE.INVENTORIES, loaded from every logical record.
Insert option in effect for this table: APPEND

Column Name Datatype	Position	Len	Term	Encl
WAREHOUSE_ID CHARACTER	FIRST	*	,	
PRODUCT_ID CHARACTER	NEXT	*	,	

```
QUANTITY_ON_HAND          NEXT      *      ,
CHARACTER

Record 1: Rejected - Error on table OE.INVENTORIES.
ORA-02291: integrity constraint (OE.INVENTORIES_PRODUCT_ID_FK)
violated - parent key not found

Record 2: Rejected - Error on table OE.INVENTORIES.
ORA-02291: integrity constraint (OE.INVENTORIES_PRODUCT_ID_FK)
violated - parent key not found

Record 3: Rejected - Error on table OE.INVENTORIES.
ORA-02291: integrity constraint (OE.INVENTORIES_PRODUCT_ID_FK)
violated - parent key not found

... /* Note all 51 rows are Rejected */

Record 50: Rejected - Error on table OE.INVENTORIES.
ORA-02291: integrity constraint (OE.INVENTORIES_PRODUCT_ID_FK)
violated - parent key not found

Record 51: Rejected - Error on table OE.INVENTORIES.
ORA-02291: integrity constraint (OE.INVENTORIES_PRODUCT_ID_FK)
violated - parent key not found

MAXIMUM ERROR COUNT EXCEEDED - Above statistics reflect partial
run.

Table OE.INVENTORIES:
  0 Rows successfully loaded.
51 Rows not loaded due to data errors.
  0 Rows not loaded because all WHEN clauses were failed.
  0 Rows not loaded because all fields were null.

Space allocated for bind array:                                49536 bytes (64
rows)
Read    buffer bytes: 1048576

Total logical records skipped:        0
Total logical records read:          64
Total logical records rejected:     51
Total logical records discarded:    0
```

```
Run began on Thu Oct 16 11:14:25 2014
Run ended on Thu Oct 16 11:14:26 2014

Elapsed time was:      00:00:00.55
CPU time was:         00:00:00.03
$
```

The loader attempted to load 50 rows, but not more than that because the configuration specifies to stop after 50 errors. The load could not be successfully completed due to constraint violations.

- d. Re-attempt a DIRECT load by ignoring the constraints.

```
$ sqlldr userid=oe/oracle_4U control=lab_16_02_02.ctl
log=lab_16_02_02.log data=lab_16_02_02.dat DIRECT=TRUE

SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:18:48 2014

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Path used:      Direct

Load completed - logical record count 83.

Table OE.INVENTORIES:
  83 Rows successfully loaded.

Check the log file:
  lab_16_02_02.log
for more information about the load.
$
```

- e. Read the log file. You can see that constraints were automatically disabled.

```
$ cat lab_16_02_02.log

SQL*Loader: Release 12.1.0.2.0 - Production on Thu Oct 16
11:18:48 2014

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Control File:    lab_16_02_02.ctl
Data File:       lab_16_02_02.dat
Bad File:        lab_16_02_02.bad
Discard File:   none specified
```

(Allow all discards)

Number to load: ALL
Number to skip: 0
Errors allowed: 50
Continuation: none specified
Path used: Direct

Table OE.INVENTORIES, loaded from every logical record.
Insert option in effect for this table: APPEND

Column Name	Position	Len	Term	Encl	Datatype
WAREHOUSE_ID	FIRST	*	,		CHARACTER
PRODUCT_ID	NEXT	*	,		CHARACTER
QUANTITY_ON_HAND	NEXT	*	,		CHARACTER

Referential Integrity Constraint/Trigger Information:
NULL, UNIQUE, and PRIMARY KEY constraints are unaffected.

Constraint OE.INVENTORIES.INVENTORIES_WAREHOUSES_FK was disabled
and novalidated before the load.

Constraint OE.INVENTORIES.INVENTORIES_PRODUCT_ID_FK was disabled
and novalidated before the load.

The following index(es) on table OE.INVENTORIES were processed:
index OE.INVENTORY_IX loaded successfully with 83 keys
index OE.INV_PRODUCT_IX loaded successfully with 83 keys

Table OE.INVENTORIES has no constraint exception table.
No CHECK, REFERENTIAL constraints were re-enabled after the
load.

Table OE.INVENTORIES:

83 Rows successfully loaded.

0 Rows not loaded due to data errors.

0 Rows not loaded because all WHEN clauses were failed.

0 Rows not loaded because all fields were null.

Bind array size not used in direct path.

Column array rows : 5000

Stream buffer bytes: 256000

Read buffer bytes: 1048576

```
Total logical records skipped:          0
Total logical records read:            83
Total logical records rejected:        0
Total logical records discarded:       0
Total stream buffers loaded by SQL*Loader main thread:    1
Total stream buffers loaded by SQL*Loader load thread:    0

Run began on Thu Oct 16 11:18:48 2014
Run ended on Thu Oct 16 11:18:49 2014

Elapsed time was:        00:00:01.05
CPU time was:            00:00:00.03
$
```

- f. View the rows inserted into the table.

```
$ sqlplus oe/oracle_4U
...
SQL> SELECT * FROM inventories WHERE quantity_on_hand = 7
      2 AND WAREHOUSE_ID>500 ;

PRODUCT_ID WAREHOUSE_ID QUANTITY_ON_HAND
-----
      1001          501              7
      1001          502              7
      ...
      1030          583              7

83 rows selected.

SQL> EXIT
$
```

3. Execute the `$LABS/P16/lab_16_cleanup.sh` script to remove the rows and files generated by this practice.

```
$ $LABS/P16/lab_16_cleanup.sh
8 rows deleted.

Commit complete.

83 rows deleted.

Commit complete.

$
```


Practices for Lesson 17: Database Maintenance

Chapter 17

Practices for Lesson 17: Overview

Practices Overview

Background: You want to proactively monitor your `orcl` database so that common problems can be fixed before they affect users. Users, developers, and unanticipated changes in the way applications are used can bring serious performance problems. As DBA you are seldom informed about what changed, you are instead told there is a generic problem. At that point you must find the problem based often on misleading information from users.

In this scenario, a developer is providing scripts for you to run to provision changes to an application. These supplied scripts create a problem so that you can familiarize yourself with the tools that are available. Examine each script to satisfy yourself that the script is doing what you have been told.

These practices have been scripted because delays in performing the tasks can have a large effect on the results you see due to the short time that the workload runs.

Practice 17-1: Database Maintenance

1. A new tablespace is being added to hold the new tables. The first script creates a new locally managed tablespace called TBSSPC with a data file named /u01/app/oracle/oradata/orcl/tbsspc01.dbf of 50 MB. Ensure that the TBSSPC tablespace does not use Automatic Segment Space Management (ASSM). The lab_17_01_01.sh script performs these tasks. Examine the script and then execute it. In a terminal window enter:

```
$ cd $LABS/P17
$ cat lab_17_01_01.sh
...
sqlplus / as sysdba << END

set echo on

drop tablespace TBSSPC including contents and datafiles;

CREATE SMALLFILE TABLESPACE "TBSSPC"
DATAFILE '/u01/app/oracle/oradata/orcl/tbsspc01.dbf' SIZE 50M
AUTOEXTEND ON NEXT 10M MAXSIZE 200M
LOGGING
EXTENT MANAGEMENT LOCAL
SEGMENT SPACE MANAGEMENT MANUAL;

exit;
END

$ ./lab_17_01_01.sh
...
Connected to:
...
SQL> SQL> SQL> SQL> drop tablespace TBSSPC including contents
and datafiles
*
ERROR at line 1:
ORA-00959: tablespace 'TBSSPC' does not exist

SQL> SQL> 2      3      4      5      6
Tablespace created.

SQL> SQL> Disconnected ...
$
```

Note: Because this is the first time you have run this script, the error shown when the tablespace is dropped is expected.

2. The `lab_17_01_02.sh` script adds a new user. The script creates the SPCT user, identified by oracle_4U, assigns the TBSSPC tablespace as the default tablespace, assigns the TEMP tablespace as the temporary tablespace, and grants the CONNECT, RESOURCE, and DBA roles to the SPCT user. Execute the `lab_17_01_02.sh` script to perform these tasks. In a terminal window, enter:

```
$ cat lab_17_01_02.sh
...
cd $LABS/P17

. $LABS/set_db.sh

sqlplus / as sysdba << END

set echo on

drop user spct cascade;

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

grant connect, resource, dba to spct;

exit;
END
$


$ ./lab_17_01_02.sh
...
Connected to:
...
SQL> SQL> SQL> SQL> drop user spct cascade
*
ERROR at line 1:
ORA-01918: user 'SPCT' does not exist


SQL> SQL> 2      3
User created.

SQL> SQL>
Grant succeeded.
```

```
SQL> SQL> Disconnected ...  
$
```

3. The test workload that is provided runs only a few minutes. In order to get meaningful data, the time between Automatic Workload Repository (AWR) snapshots should be reduced. Use the DBMS_ADVISOR package to set the database activity time to 30 minutes. The test script, running as the SPCT user, drops and creates the SPCT table and gathers statistics for this table. It also creates a snapshot in AWR. Execute the lab_17_01_03.sh script to perform these tasks. In a terminal window, enter:

```
$ cat lab_17_01_03.sh  
...  
cd $LABS/P17  
  
. $LABS/set_db.sh  
  
sqlplus / as sysdba << EOF  
  
set echo on  
  
exec  
dbms_advisor.set_default_task_parameter('ADDM','DB_ACTIVITY_MIN'  
,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_17_01_03.sh  
...  
Connected to:  
...  
SQL> SQL> SQL> SQL>  
PL/SQL procedure successfully completed.  
  
SQL> SQL> Connected.  
SQL> SQL> drop table spct purge
```

```

*
ERROR at line 1:
ORA-00942: table or view does not exist

SQL>
Table created.

SQL> SQL> > >
PL/SQL procedure successfully completed.

SQL> SQL>
PL/SQL procedure successfully completed.

SQL> SQL> Disconnected ...

$
```

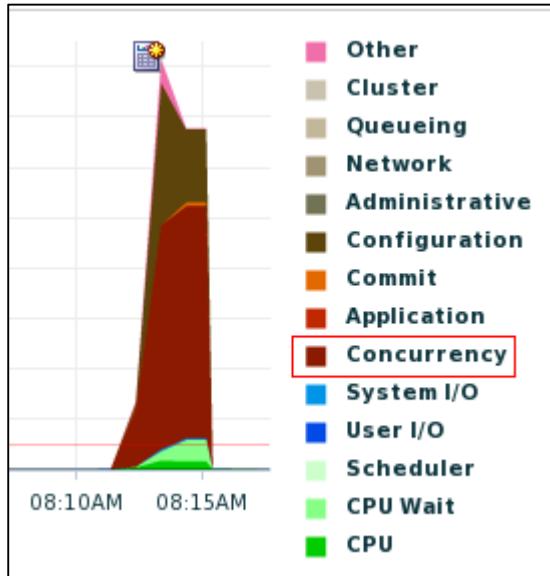
- Run the workload script. This creates an activity to be analyzed. Execute the `lab_17_01_04.sh` script to perform these tasks. DO NOT wait for the script to finish continue to the next step.

```
$ ./lab_17_01_04.sh
```

- Watch the activity in the Active Session Graph on the Cloud Control Performance Home page until the script completes.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Login User: ADMIN Password: oracle_4U
b.	Summary	Navigate to the <code>orcl</code> database home page.
c.	orcl database home	Click Performance > Performance Home.
d.	Database Login	Credentials: Select Preferred . Preferred Credential Name: SYSDBA Database Credentials Click Login .
e.	Database Instance: orcl	Verify that the refresh rate is set to Real Time: 15 Second Refresh Watch the Average Active Session graph until It has peaked and returned to the previous low level.

This is your activity to be analyzed. By looking at the graph, you can determine that this instance is suffering from concurrency problems.



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

After the spike is finished, execute the `lab_17_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.

6. After the spike has finished, return to the terminal window to execute the `lab_17_01_05.sh` script.

Note: You may have to press Enter after the PL/SQL procedures from step 4 have completed in order to see the command prompt again.

```
$ ./lab_17_01_05.sh
...
Connected to:
..
SQL> SQL> SQL> SQL>
PL/SQL procedure successfully completed.

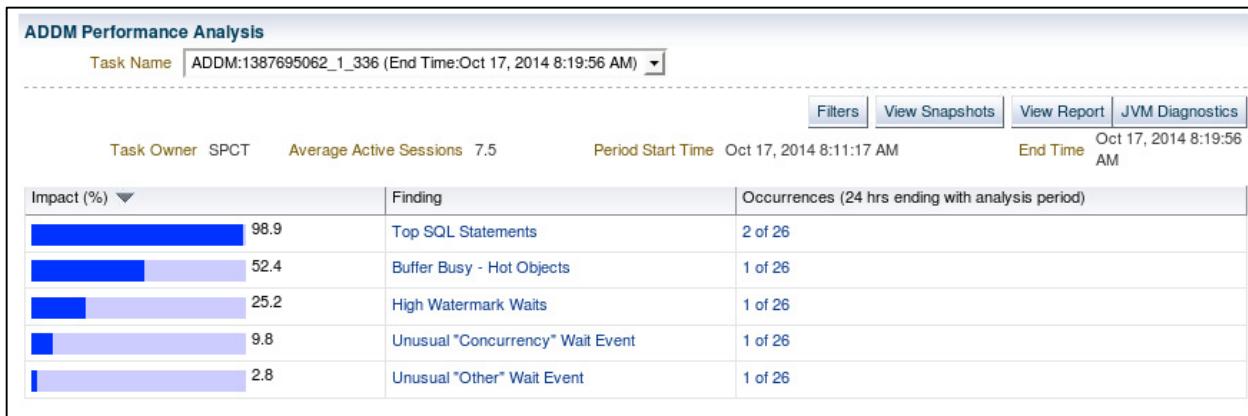
SQL> SQL> > >
PL/SQL procedure successfully completed.

SQL> SQL> Disconnected ...
$
```

7. Find and examine the ADDM Performance Analysis and findings.

Step	Window/Page Description	Choices or Values
a.	Database Instance: orcl	Click Performance > Advisors Home
b.	Advisors Central	In the result section, click the latest ADDM report.
c.	Automatic Database Diagnostic Monitor (ADDM)	Notice the findings. Click each finding. Review the Detail findings.

- d. 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:



- e. Looking at the Performance Analysis section, you see that the first finding has a high percentage (in this example, 98.9 percent) impact on the system. So your first step is to look at this finding in more detail. Click the link in the Finding column. In the Recommendations Rationale, you find a statement “waiting for event ‘Buffer Busy Waits’”.

Advisor Central > Automatic Database Diagnostic Monitor (ADDM):SPCT.ADDM:1387695062_1_336 > Performance Finding Details Logged in as DBA1

Performance Finding Details: Top SQL Statements

Finding SQL statements consuming significant database time were found. These statements offer a good opportunity for performance improvement.

Finding History

Impact (Active Sessions) 7.41
Percentage of Finding's Impact (%) 98.9

Period Start Time Oct 17, 2014 8:11:17 AM
End Time Oct 17, 2014 8:19:56 AM
Filtered No Filters

Recommendations

Show All Details | Hide All Details

Details	Category	Benefit (%)
Hide SQL Tuning		96.4
Action	Investigate the INSERT statement with SQL_ID "3csh3g3mjhzmz" for possible performance improvements. You can supplement the information given here with an ASH report for this SQL_ID. SQL Text <code>INSERT INTO SPCT VALUES (NULL,'a')</code> SQL ID <code>3csh3g3mjhzmz</code>	
Rationale	The SQL spent only 3% of its database time on CPU, I/O and Cluster waits. Therefore, the SQL Tuning Advisor is not applicable in this case. Look at performance data for the SQL to find potential improvements.	
Rationale	Database time for this SQL was divided as follows: 100% for SQL execution, 0% for parsing, 0% for PL/SQL execution and 0% for Java execution.	
Rationale	SQL statement with SQL_ID "3csh3g3mjhzmz" was executed 659999 times and had an average elapsed time of 0.0055 seconds.	
Rationale	Waiting for event "eng: HW - contention" in wait class "Configuration" accounted for 42% of the database time spent in processing the SQL statement with SQL_ID "3csh3g3mjhzmz".	
Rationale	Waiting for event "buffer busy waits" in wait class "Concurrency" accounted for 38% of the database time spent in processing the SQL statement with SQL_ID "3csh3g3mjhzmz".	
Rationale	Waiting for event "latch: In memory undo latch" in wait class "Concurrency" accounted for 8% of the database time spent in processing the SQL statement with SQL_ID "3csh3g3mjhzmz".	
Rationale	Top level calls to execute the PL/SQL statement with SQL_ID "0k8um5gmv428v" are responsible for 100% of the database time spent on the INSERT statement with SQL_ID "3csh3g3mjhzmz". SQL Text <code>declare t number; begin for t in 1..20000 loop insert into spct values (Null,'a'); end loop; end;</code> SQL ID <code>0k8um5gmv428v</code>	
Show SQL Tuning		2.5

- f. Return to the ADDM Performance Analysis page and investigate the other ADDM findings in order of severity. Look at the **Buffer Busy** findings in particular by clicking the link in the Finding column. 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 Rationale shows that there is a hot data block that belongs to the SPCT.SPCT table.

The findings may appear in a different order than shown. 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_17_01_04.sh and lab_17_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.

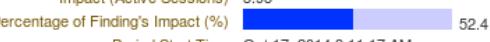
Advisor Central > Automatic Database Diagnostic Monitor (ADDM):SPCT.ADDM:1387695062_1_336 > Performance Finding Details

Logged in as DBA1

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) 3,93

Percentage of Finding's Impact (%)  52.4

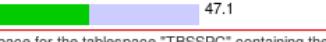
Period Start Time Oct 17, 2014 8:11:17 AM

End Time Oct 17, 2014 8:19:56 AM

Filtered No [Filters](#)

Recommendations

Show All Details | Hide All Details

Details	Category	Benefit (%) ▾
▽ Hide	Schema	 47.1
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 95251. Alternatively, you can move this object to a different tablespace that is locally managed with automatic segment space management.	
Database Object	SPCT.SPCT	

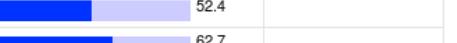
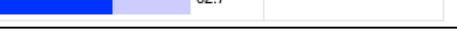
Rationale There was significant read and write contention on TABLE "SPCT.SPCT" with object ID 95251.

Database Object SPCT.SPCT

▷ Show Schema	47.1
▷ Show Schema	 47.1

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.	 52.4	
▽ Read and write contention on database blocks was consuming significant database time.	 52.4	
Wait class "Concurrency" was consuming significant database time.	 62.7	

- 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. Ensure that the TBSSPC2 tablespace uses the Automatic Segment Space Management feature. Then execute the `lab_17_01_07.sh` script to drop the SPCT table, re-create the table in the new tablespace, gather statistics, and to take a new snapshot.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Click Administration > Storage > Tablespaces
b.	Tablespaces	Click Create .
c.	Create Tablespace	Enter Name: TBSSPC2 In the Datafiles section, click Add .
d.	Add Datafile	Enter File Name: tbsspc02.dbf File Size: 50 MB Verify Automatically extend data file when full is NOT checked Click Continue .
e.	Create Tablespace	Click the Storage tab.
f.	Create Tablespace: Storage tab	Verify Extent Allocation: Automatic

Step	Window/Page Description	Choices or Values
		Segment Space Management: Automatic Click Show SQL .
g.	Show SQL	Examine the SQL Statement. It should be: <pre>CREATE SMALLFILE TABLESPACE "TBSSPC2" DATAFILE '/u01/app/oracle/oradata/orcl/tbsspc02.dbf' SIZE 50M LOGGING EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO</pre> Click Return .
h.	Create Tablespace: Storage tab	Click OK .
i.	Tablespaces	

In a terminal window, enter:

```
$ ./lab_17_01_07.sh
...
Connected to:
...
SQL> SQL> SQL> SQL>
Table dropped.

SQL> SQL>
Tablespace dropped.

SQL> SQL>
Table created.

SQL> SQL> > >
PL/SQL procedure successfully completed.

SQL> SQL>
PL/SQL procedure successfully completed.

SQL> SQL> Disconnected ...
$
```

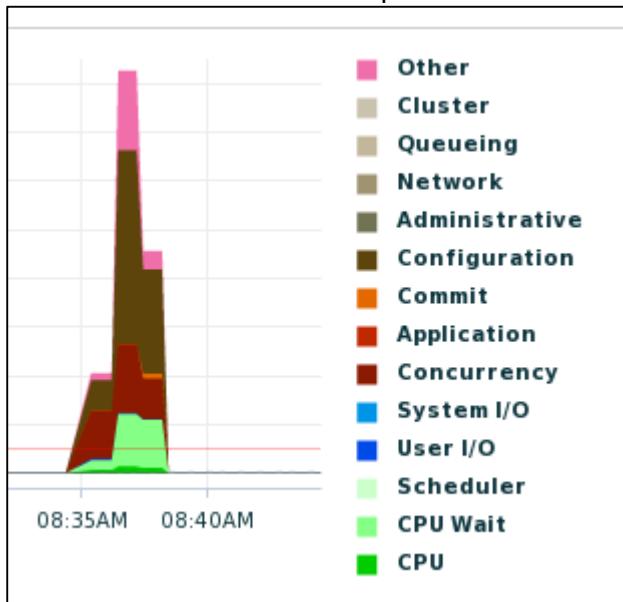
9. Execute your workload again. (Use the `lab_17_01_04.sh` script.) DO NOT wait for the script to complete continue to next task.

```
$ ./lab_17_01_04.sh
```

10. Return to Enterprise Manager Cloud Control. On the `orcl` Performance Home page, review the Average Active Session graph. View performance data in real time with a 15-second refresh cycle. After a while, you should see a spike on the Average Active Sessions graph. **Hint:** This is that same procedure that you used in Task 5.

After the spike is finished, execute the `lab_17_01_05.sh` script again. This script forces the creation of a new snapshot and gathers statistics on the table in the workload test.

- Invoke Enterprise Manager as the `DBA1` user in the `SYSDBA` role for your `orcl` database.
- Select **Performance Home** in the **Performance** menu. Watch for the spike in the Active Sessions chart to complete.



- After the spike is finished, run the `lab_17_01_05.sh` script to force the creation of a new snapshot and gather statistics on your `SPCT` table.

Note: You may have to press Enter after the PL/SQL procedures from step 9 have completed in order to see the command prompt again.

```
$ ./lab_17_01_05.sh
```

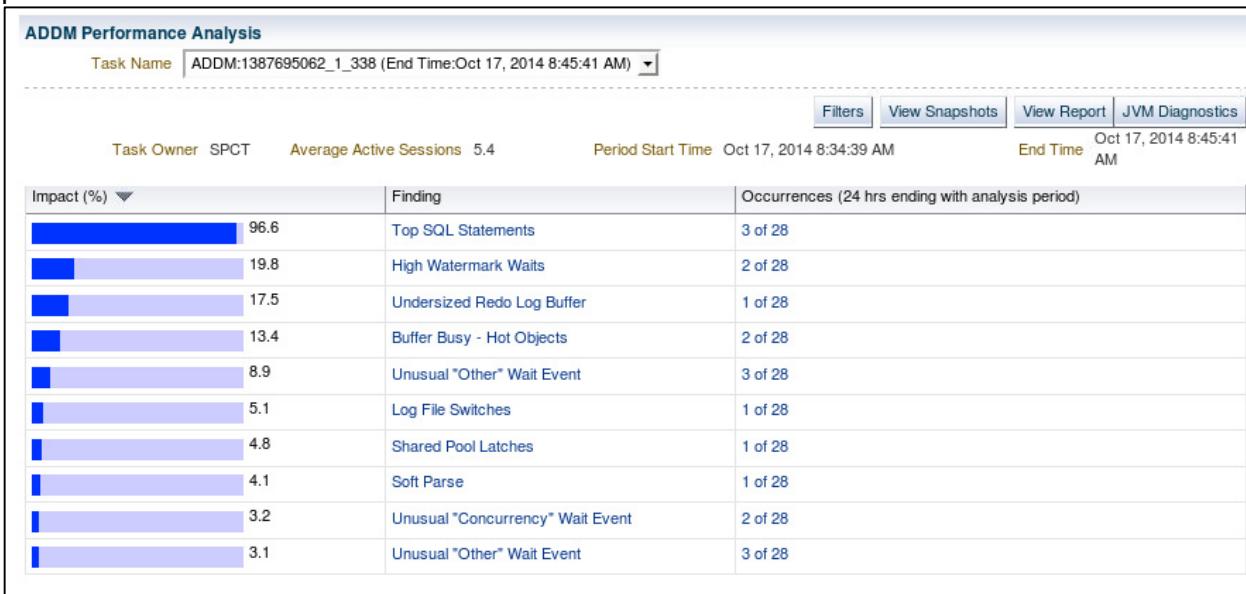
11. Review the ADDM from the **Advisor Home** link.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Click Performance > Advisors Home .
b.	Advisor Central	Click the latest ADDM report.
c.	Automatic Database Diagnostic Monitor (ADDM)	Review the ADDM Performance Analysis section.

You see that the impact value for the Buffer Busy finding (indicating read-and-write contention) has been greatly reduced or 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.



12. Execute the `lab_17_01_11.sh` script to clean up your environment so that this practice will not affect other practices.

```
$ ./lab_17_01_11.sh
...
SQL> SQL>
User dropped.

SQL> SQL>
Tablespace dropped.

SQL> SQL>
Tablespace dropped.

SQL> SQL> Disconnected...
```


Practices for Lesson 18: Managing Performance

Chapter 18

Practices for Lesson 18: Overview

Practices Overview

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 \$LABS/P18 directory. Other directories are individually named.

Practice 18-1: Managing Performance

1. Log in to SQL*Plus as the DBA1 user and perform maintenance on tables in the HR schema by running the `lab_18_01_01.sql` script.

```
$ cd $LABS/P18
$ . oraenv
ORACLE_SID = [oracle] ? orcl
...
$ cat lab_18_01_01.sql
-- Oracle Database 12c: Administration Workshop
-- Oracle Server Technologies - Curriculum Development
--
-- ***Training purposes only***
-- ***Not appropriate for production use***
--
-- Moves the table hr.employees from one location to another.
This
-- helps fix any migrated rows, as well as compacting unused
space
-- in the segment that may have been caused by deleting data.
-- Has the side effect of making all indexes on this table
UNUSABLE

alter table hr.employees move;

$ sqlplus DBA1/oracle_4U as sysdba
SQL> @lab_18_01_01.sql

Table altered.
```

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_18_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> !cat lab_18_01_02.sql
-- Oracle Database 12c: Administration Workshop
-- Oracle Server Technologies - Curriculum Development
--
-- ***Training purposes only***
-- ***Not appropriate for production use***
--
```

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

SQL> @lab_18_01_02.sql

EMPLOYEE_ID FIRST_NAME           LAST_NAME
-----
EMAIL          PHONE_NUMBER        HIRE_DATE   JOB_ID
SALARY

-----
COMMISSION_PCT MANAGER_ID DEPARTMENT_ID
-----

 200 Jennifer      Whalen
JWHALEN       515.123.4444        17-SEP-03 AD_ASST
4400

          101          10

EMPLOYEE_ID FIRST_NAME           LAST_NAME
-----
EMAIL          PHONE_NUMBER        HIRE_DATE   JOB_ID
SALARY

-----
COMMISSION_PCT MANAGER_ID DEPARTMENT_ID
-----

 200 Jennifer      Whalen
JWHALEN       515.123.4444        17-SEP-03 AD_ASST
4400

          101          10

EMPLOYEE_ID FIRST_NAME           LAST_NAME
-----
EMAIL          PHONE_NUMBER        HIRE_DATE   JOB_ID
SALARY

-----
COMMISSION_PCT MANAGER_ID DEPARTMENT_ID
-----
```

200 Jennifer	Whalen
JWHALEN	515.123.4444
4400	17-SEP-03 AD_ASST
101	10
SQL>	

3. Using Cloud Control, locate the **HR** session in which the above statement was just executed, and view the execution plan for that statement.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Navigate to the orcl database target.
b.	orcl database home	Click Performance > Search Sessions .
c.	Database Login	Connect by using Preferred SYSDBA Credentials.
d.	Search Sessions	Select “ DB User ” in the Filter field menu. Enter HR . Click Go .
e.	Search Sessions	Click the SID number in the Results listing.
f.	Session Details	Click the hash value link to the right of the “Previous SQL” label in the Application section.

Top Activity > Session Details: 261 (HR)

Session Details: 261 (HR)

Logged in as DBA1

View Data Real Time: 15 Second Refresh Refresh

Collected From Target Oct 17, 2014 12:06:39 PM

Kill Session Enable SQL Trace

General	Activity	Statistics	Open Cursors	Blocking Tree	Wait Event History	Parallel SQL	SQL Monitoring
Server	Client	Application					
Current Status INACTIVE Serial Number 11921 DB User Name HR OS Process ID 6315 Login Time Oct 17, 2014 12:02:23 PM Login Duration 4:16 (mm:ss) Connection Type DEDICATED Type USER Resource Consumer Group OTHER_GROUPS	OS User Name oracle OS Process ID 6253 Host EDRSR9P1 Terminal pts/1 Current Client ID Unavailable Current Client Info Unavailable	Current SQL None Current SQL Command UNKNOWN Previous SQL bckcqw5pd108f Last Call Duration 3:55 (mm:ss) SQL Trace DISABLED Current SQL Trace Level 1 Trace With Wait Information DISABLED Trace With Bind Information DISABLED Open Cursors 15 Program sqlplus@EDRSR9P1 (TNS V1-V3) Service SYS\$USERS Current Module SQL*Plus Current Action Unavailable					

Step	Window/Page Description	Choices or Values
g.	SQL Details	Click the Plan tab to see the execution plan for the query. Select the Tabular radio button.

Top Activity > SQL Details: bckcqw5pd108f
SQL Details: bckcqw5pd108f

Logged in as DBA1

Switch to SQL ID Go View Data Real Time: Manual Refresh Refresh SQL Worksheet Actions SQL Details Active Report Go

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 Oct 17, 2014 12:10:04 PM GMT+00:00 Parsing Schema HR Optimizer Mode ALL_ROWS

Additional Information

Graphical Tabular

Operation	Object	Order	Predic...	Prun...	Operation Cost	Estimated Rows	Estimated Bytes
SELECT STATEMENT		2					
TABLE ACCESS FULL	HR.EMPLOYEES	1			3	1	69

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.

- Using Cloud Control, check to see the status of the EMPLOYEE table's index on EMPLOYEE_ID. See if it is VALID.

Step	Window/Page Description	Choices or Values
a.	SQL Details	Click Schema > Database Objects > Indexes .
b.	Indexes	Select Table Name in the "Search By" menu. Enter HR in the Schema field. Enter EMPLOYEES in the Object field. Click Go .
c.	Indexes	In the Index column, click the EMP_EMP_ID_PK index.

Selection Mode Single

Edit View Delete Actions Create Like Go

Select	Table Owner	Table	Indexed Columns	Index Owner	Index	Table Type
<input checked="" type="radio"/>	HR	EMPLOYEES	DEPARTMENT_ID	HR	EMP_DEPARTMENT_IX	TABLE
<input type="radio"/>	HR	EMPLOYEES	EMAIL	HR	EMP_EMAIL_UK	TABLE
<input type="radio"/>	HR	EMPLOYEES	EMPLOYEE_ID	HR	EMP_EMP_ID_PK	TABLE
<input type="radio"/>	HR	EMPLOYEES	JOB_ID	HR	EMP_JOB_IX	TABLE
<input type="radio"/>	HR	EMPLOYEES	MANAGER_ID	HR	EMP_MANAGER_IX	TABLE
<input type="radio"/>	HR	EMPLOYEES	LAST_NAME, FIRST_NAME	HR	EMP_NAME_IX	TABLE

Step	Window/Page Description	Choices or Values
d.	View Index: HR.EMP_EMP_ID_PK	In the General section, check the status of the index. You should see a value of UNUSABLE .

Indexes > View Index: HR.EMP_EMP_ID_PK

View Index: HR.EMP_EMP_ID_PK

General

- Name EMP_EMP_ID_PK
- Schema HR
- Tablespace EXAMPLE
- Index Type Normal
- Status **UNUSABLE**

Indexed Table Object

- Index On Table
- Schema HR
- Name EMPLOYEES

Index Columns

Column Name	Data Type	Sorting Order
EMPLOYEE_ID	NUMBER	ASC

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

```
SQL> COL INDEX_NAME FORMAT A20
SQL> COL TABLE_NAME FORMAT A20
SQL> select index_name, table_name, status
2> 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
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 need to fix.
6. You decide to use Cloud Control to reorganize all the indexes in the `HR` schema that are marked as `UNUSABLE`.

Step	Window/Page Description	Choices or Values
a.	View Index: HR.EMP_EMP_ID_PK	Select Reorganize in the Actions menu. Click Go .
b.	Reorganize Objects: Objects	Click Add .
c.	Objects: Add	Select Indexes in the Type menu. Enter <code>HR</code> in the Schema field. Enter <code>EMP_</code> in the Object Name field. Click Search .
d.	Objects: Add	In the Available Objects section, select all the indexes that match the <code>UNUSABLE</code> indexes in Step 5. Click OK .
e.	Reorganize Objects: Objects	Check that the six unusable indexes are listed. Click Next .
f.	Reorganize Objects: Options	Accept the default options. Click Next .
g.	Processing: Generating Script	Displays briefly.
h.	Reorganize Objects: Impact Report	The Script Generation Information section should show no warnings or errors. Click Next .
i.	Reorganize Objects: Schedule	In the Host Credentials section, select New . Enter Username: <code>oracle</code> Enter password: <OS password> Click Test . When return is Test Successful, click Next .
j.	Reorganize Objects: Review	Click Submit Job .
k.	Job Activity	A Confirmation message appears. Click the REORGANIZE job name listed in the Confirmation Message.
l.	Job Run: REORGANIZE_ORCL_*	Refresh the Browser until the job shows Succeeded .

orcl > Job Activity > Job Run: REORGANIZE_ORCL_41

Page Refreshed Oct 17, 2014 12:23:01 PM UTC C

Job Run: REORGANIZE_ORCL_41

[Delete Run](#) [Edit](#) [View Definition](#)

Summary

Status Succeeded
 Scheduled Oct 17, 2014 12:22:41 PM GMT+00:00
 Started Oct 17, 2014 12:22:47 PM GMT+00:00
 Ended Oct 17, 2014 12:22:58 PM GMT+00:00
 Elapsed Time 11 seconds

Type Reorganize
 Owner ADMIN
 Description Reorganize Job:
 Execution ID 059D69BE55A0683BE0536D23B98B5340
 Script /u01/app/oracle/product/12.1.0/d...
 dbCreds NC_ORCL_2014-10-09-100609 (dba1/*********)
 hostCreds NC_ORCL_2014-10-15-130428 (oracle/*********)

Targets
 Status All
[Expand All](#) [Collapse All](#)

Name	Targets	Status	Started	Ended	Elapsed Time
Execution: orcl	orcl	Succeeded	Oct 17, 2014 12:22:47 PM GMT+00:00	Oct 17, 2014 12:22:58 PM GMT+00:00	11 seconds
Step: Reorganize	orcl	Succeeded	Oct 17, 2014 12:22:47 PM GMT+00:00	Oct 17, 2014 12:22:58 PM GMT+00:00	11 seconds

7. Return to the SQL*Plus session where the HR user is logged in and run the `lab_18_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.
- a. Enter the following at the SQL*Plus prompt:

```
SQL> @lab_18_01_07.sql
```

Repeat the tasks listed in step 3 to view the execution plan for the query. Now the icon indicates the use of an index. Select the **Tabular** radio button. 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 Oct 17, 2014 12:26:27 PM GMT+00:00 Parsing Schema HR Optimizer Mode ALL_ROWS

Additional Information

Graphical Tabular

Operation	Object	Order	Predic	Pru...	Operation Cost	Estimated Ro...	Estimate
SELECT STATEMENT		3					
TABLE ACCESS BY INDEX ROWID	HR.EMPLOYEES	2			1	1	
INDEX UNIQUE SCAN	HR.EMP_EMP_ID_P	1				1	

- b. Exit 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 you reorganized the indexes.

9. Simulate a working load on your instance by running the `lab_18_01_09.sql` script as the `SYS` user. **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. Remember to set your environment appropriately by using `oraenv` in the new terminal window before connecting to SQL*Plus.

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

```
$ sqlplus DBA1/oracle_4U@orcl as sysdba
SQL> @lab_18_01_09.sql

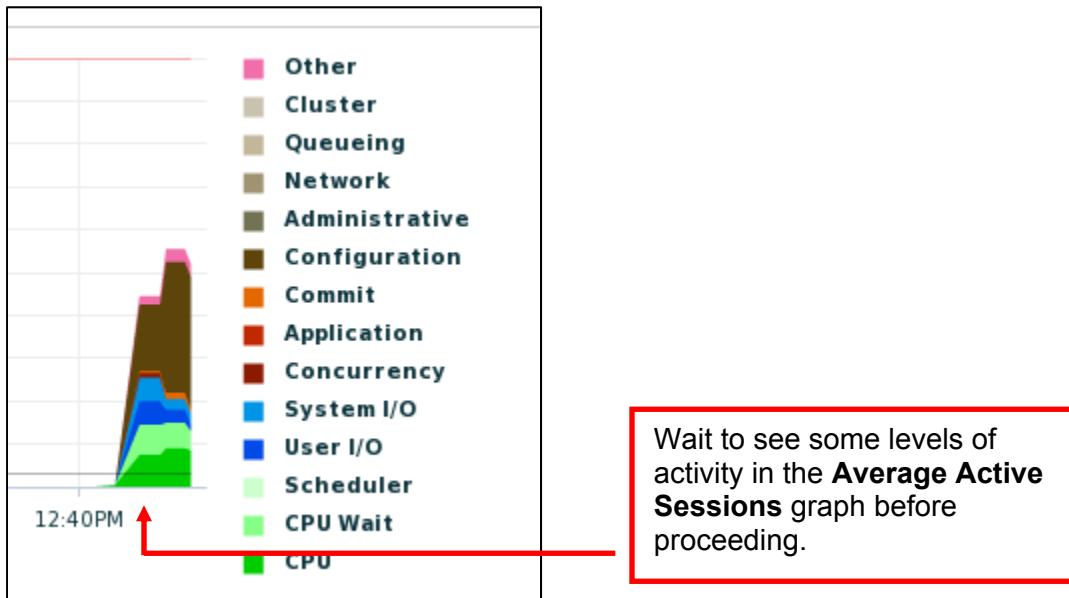
SID is 261

PL/SQL procedure successfully completed.

Load is now being generated.
```

10. Go back to Cloud Control and examine the performance of your database.

Step	Window/Page Description	Choices or Values
a.	orcl database home	Click Performance > Performance Home to investigate system performance.
b.	Database Instance: orcl	<p>View the Average Active session Graph at the bottom of the page.</p> <p>Note: You may need to wait a minute or two to see the effects of the load generation script appear on the graphs.</p>



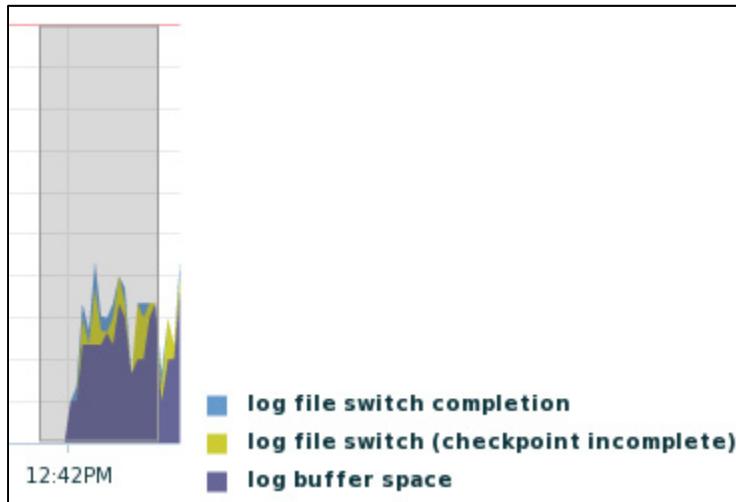
Question 1: In the **Average Active Sessions** graph, which are the two main categories that active sessions are waiting for?

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

Step	Window/Page Description	Choices or Values
c.	Database Instance: orcl	Click Configuration in the legend.
d.	Active Sessions Waiting: Configuration	Examine the Active Sessions Waiting: Configuration graph.

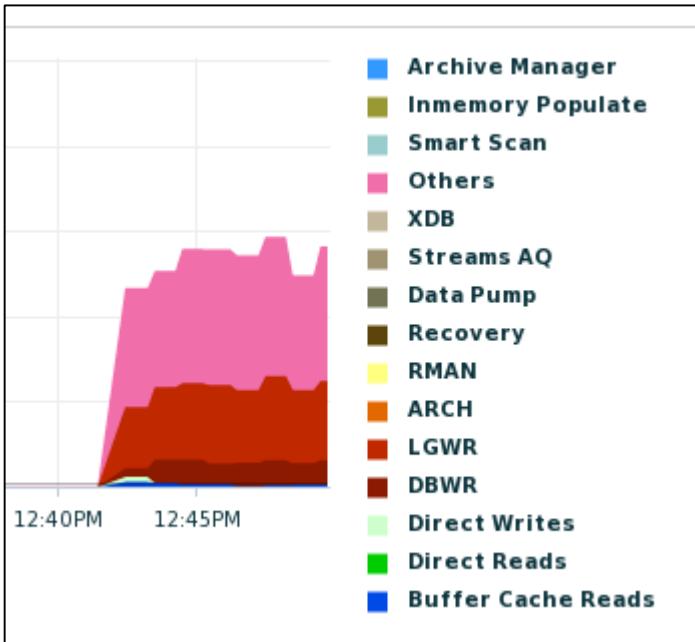
Question 2: In the Configuration category of waits, what is one of the contributors to the wait time?

Answer: Log buffer space is the highest in this example.



Step	Window/Page Description	Choices or Values
a.	Active Sessions Waiting: Configuration	Click the browser back button.
b.	Database Instance: orcl Performance Home	Click Settings .
c.	Performance Page Settings	In Detail Chart Settings, select I/O for Default View. Select I/O Function for I/O Chart Setting. Click OK .
d.	Database Instance: orcl Performance Home	Scroll down to I/O Megabytes per Second by I/O Function graph.

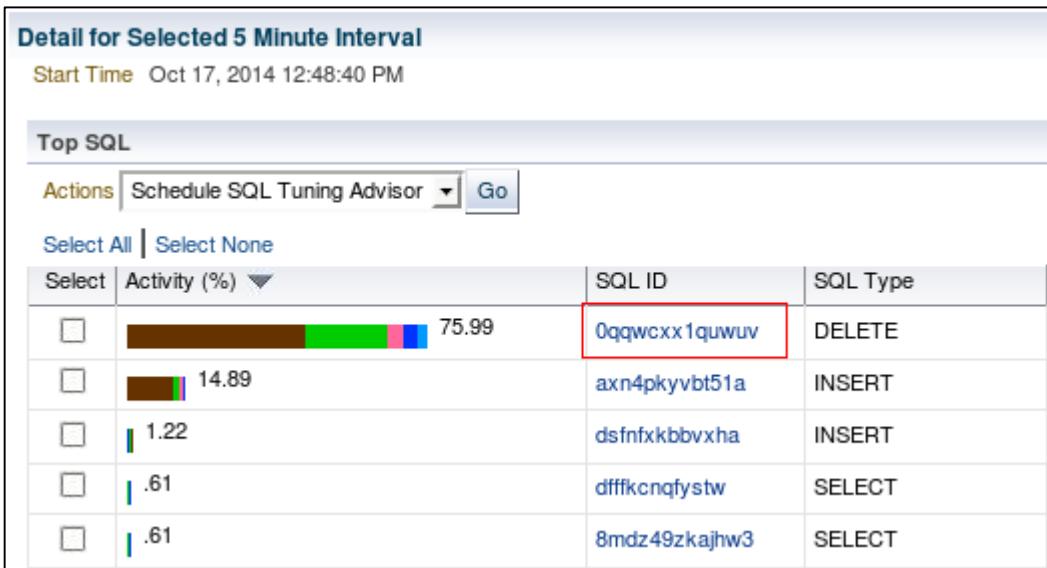
Note: The graph you see may vary from the screenshot.



Question 3: Which process is doing the most writing to the disk?

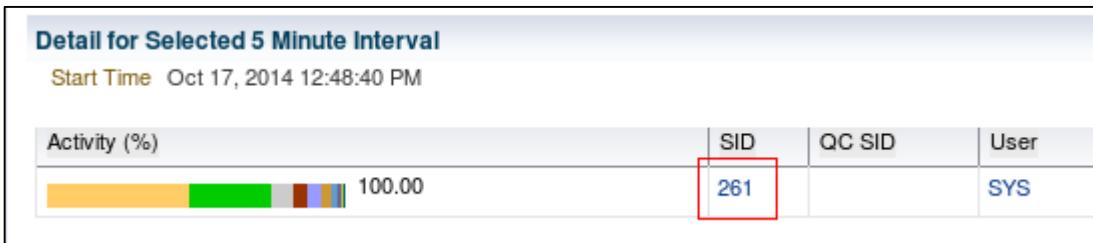
Answer: LGWR

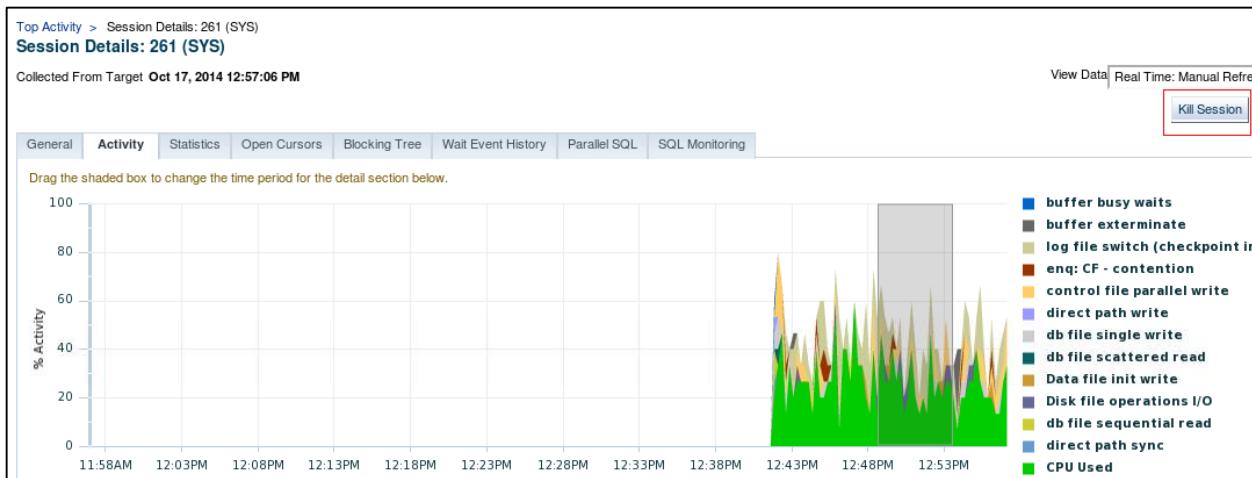
Step	Window/Page Description	Choices or Values
e.	Database Instance: orcl Performance Home	Click Top Activity link below and right of the Average Active Sessions graph. You may need to scroll to the bottom to see the horizontal scroll bar.
f.	Top Activity	Click the SQL ID of the first DELETE statement listed in the Top SQL region.
g.	SQL Details: 0qqwcxx1quwuv	



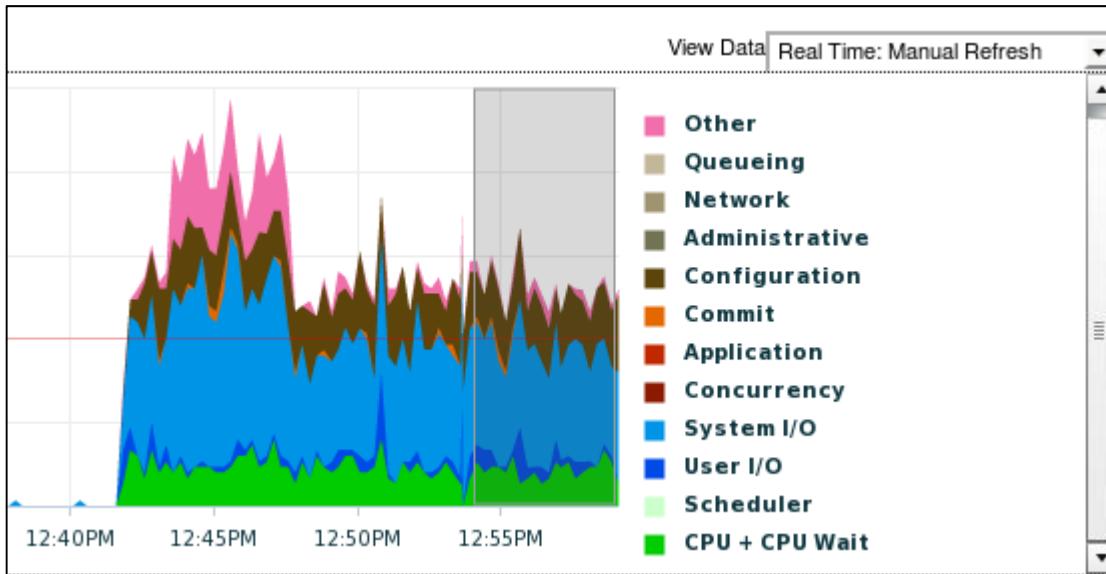
11. Kill the session that is generating the load. Use the session ID recorded in step 9. The session ID is listed in the **SID** column of the Detail for Selected 5 Minute Interval.

Step	Window/Page Description	Choices or Values
a.	SQL Details: 0qqwcxx1quwuv	Click the SID number for the session ID recorded earlier. This is found under the heading Detail for Selected 5 Minute Interval .
b.	Session Details: nn (SYS)	Click Kill Session .
c.	Confirmation	Click Yes .
d.	Session Details: nn (SYS)	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 that you are attempting to refresh information about a session that has already been killed. You can ignore this warning.





Step	Window/Page Description	Choices or Values
e.	Session Details: <i>nn</i> (SYS)	Click Top Activity in the navigation history at the top of the page.
f.	Top Activity	View the Top Activity graph. Note that the session activity in the database has declined considerably.



12. Log out of Enterprise Manager Cloud Control.

Practice 18-2: Using Automatic Memory Management

Overview

In this practice you review memory management capabilities. Note that the values you see may differ slightly from what is shown in this activity guide.

Tasks

1. Log in to SQL*Plus for the `orcl` instance as the `DBA1` user with the `oracle_4U` password and make a copy of your server parameter file (SPFILE).

```
$ sqlplus dba1/oracle_4U as sysdba
SQL> CREATE PFILE='/tmp/initorcl.ora.bak' FROM SPFILE;

File created.

SQL>
```

2. Still connected as the `DBA1` user in SQL*Plus, set the following parameters to the given value in your SPFILE only! Use the `amm_parameters.sql` file located in your `$LABS/P18` directory to set the parameters.

```
parallel_execution_message_size = 36864
parallel_max_servers = 200
parallel_adaptive_multi_user = FALSE
processes = 200
sga_target = 0
pga_aggregate_target = 0
memory_target = 624M
```

```
SQL> @amm_parameters

SQL> alter system set "parallel_execution_message_size" = 36864
SCOPE=SPFILE;

System altered.

SQL> alter system set "parallel_max_servers" = 200 SCOPE=SPFILE;

System altered.

SQL> alter system set "parallel_adaptive_multi_user" = FALSE
SCOPE=SPFILE;

System altered.

SQL> alter system set "processes" = 200 SCOPE=SPFILE;
```

```
System altered.

SQL> alter system set "pga_aggregate_target" = 0 SCOPE=SPFILE;

System altered.

SQL> alter system set "sga_target" = 0 SCOPE=SPFILE;

System altered.

SQL> alter system set "memory_target" = 624M SCOPE=SPFILE;

System altered.

SQL>
```

3. Execute the `amm_setup.sql` script.

- Drop and re-create the TBSSGA and MYTEMP tablespaces, and the AMM DBA user for which they are defaults. Then press Enter to continue.

```
SQL> @amm_setup
SQL> REM "*****"
SQL> REM "For training purposes ONLY, execute as the oracle OS
user
SQL>
SQL> set echo on
SQL> set serveroutput on
SQL> set term on
SQL> set lines 200
SQL> set pages 44
SQL> set pause on pause "Press [Enter] to continue..."
SQL>
SQL> drop tablespace tbssga including contents and datafiles;
drop tablespace tbssga including contents and datafiles
*
ERROR at line 1:
ORA-00959: tablespace 'TBSSGA' does not exist

SQL>
SQL> create tablespace tbssga datafile
'/u01/app/oracle/oradata/tbssga01.dbf' size 20m;

Tablespace created.
```

```
SQL>
SQL> drop tablespace mytemp including contents and datafiles;
drop tablespace mytemp including contents and datafiles
*
ERROR at line 1:
ORA-00959: tablespace 'MYTEMP' does not exist

SQL>
SQL> create temporary tablespace mytemp tempfile
  '/u01/app/oracle/oradata/myemp01.dbf' size 40m reuse;

Tablespace created.

SQL>
SQL> drop user amm cascade;
drop user amm cascade
*
ERROR at line 1:
ORA-01918: user 'AMM' does not exist

SQL>
SQL> create user amm
  2  identified by "oracle_4U"
  3  default tablespace tbssga
  4  temporary tablespace mytemp;

User created.

SQL>
SQL> grant connect,resource,dba to amm;

Grant succeeded.

SQL> pause Press [Enter] to continue...
Press [Enter] to continue...

Press [Enter] to continue...

SQL>
```

- b. To view the current memory components, query the V\$MEMORY_DYNAMIC_COMPONENTS view by pressing Enter to continue the script.

```
SQL>
SQL> column COMP format a20
SQL>
SQL> SELECT substr(COMPONENT, 0, 20) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US
2      FROM v$memory_dynamic_components
3      WHERE CURRENT_SIZE!=0;
Press [Enter] to continue...
```

- c. View the query result by pressing Enter to continue the script.

```
SQL>
COMP                  CS          US
-----
shared pool           314572800    0
large pool            8388608     0
java pool             4194304     0
streams pool          4194304     0
SGA Target            666894336   666894336
DEFAULT buffer cache 293601280    0
Shared IO Pool        29360128    0
PGA Target            222298112   222298112

8 rows selected.
8 rows selected.
SQL> pause Press [Enter] to continue...
Press [Enter] to continue...

SQL>
```

4. Log in as the AMM user with the oracle_4U password. Execute the amm_setup2.sql script to re-create the TABSGA table and insert rows.

```
SQL> connect amm
Enter password: oracle_4U <<< not displayed
Connected.
SQL> @amm_setup2.sql
SQL>
...
SQL> drop table tabsga purge;
drop table tabsga purge
*
ERROR at line 1:
ORA-00942: table or view does not exist
```

```
SQL>
SQL> create table tabsga(a number, b number) tablespace tbssga;

Table created.

SQL>
SQL> begin
 2   for i in 1..100000 loop
 3     insert into tabsga values (i, i);
 4   end loop;
 5 end;
 6 /

PL/SQL procedure successfully completed.

SQL> commit;

Commit complete.

SQL> pause Press [Enter] to continue...
Press [Enter] to continue...
```

- a. Modify the TABSGA table to “parallel 64” and create a TESTPGA procedure (which creates a workload) by pressing Enter to continue the script.

```
SQL>
SQL>
SQL> alter table tabsga parallel 64;

Table altered.

SQL>
SQL> create or replace procedure testpga( psize number ) as
 2 begin
 3 declare
 4   TYPE nAllotment_tabtyp      IS TABLE OF char(2048) INDEX BY
BINARY_INTEGER;
 5   myarray nAllotment_tabtyp;
 6 begin
 7   for i in 1..psize loop
 8     myarray(i) := to_char(i);
 9   end loop;
```

```

10  end;
11  end;
12  /
Procedure created.

SQL> pause Press [Enter] to continue...
Press [Enter] to continue...

```

- b. Confirm that there are no errors and query the dynamic memory components again by pressing Enter to continue the script.

```

SQL> show errors
No errors.

SQL>
SQL> SELECT substr(COMPONENT, 0, 20) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US
2      FROM v$memory_dynamic_components
3      WHERE CURRENT_SIZE!=0;
Press [Enter] to continue...

Press [Enter] to continue...

```

- c. To view the query results, press Enter to continue the script.

COMP	CS	US
shared pool	314572800	0
large pool	8388608	0
java pool	4194304	0
streams pool	4194304	0
SGA Target	666894336	666894336
DEFAULT buffer cache	293601280	0
Shared IO Pool	29360128	0
PGA Target	222298112	222298112
8 rows selected.		

```

SQL>
SQL> pause Press [Enter] to exit the script...
Press [Enter] to exit the script...

```

Note: The size of the SGA, PGA, buffer cache, and shared pool do not change between the query in step 3c and step 4c.

- d. Exit the script, but remain in the SQL*Plus session.

```

SQL> set pause off
SQL>

```

5. Connect as SYSDBA in your SQL*Plus session, and shut down and restart your database instance. Reconnect as the AMM user with the oracle_4U password:

```
SQL> connect dba1/oracle_4U as sysdba
Connected.
SQL> shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.

SQL>
SQL> STARTUP
ORACLE instance started.

Total System Global Area  734003200 bytes
Fixed Size                  2928728 bytes
Variable Size                562040744 bytes
Database Buffers            163577856 bytes
Redo Buffers                 5455872 bytes
Database mounted.
Database opened.

SQL>
SQL> connect amm
Enter password: oracle_4U <<< not displayed
Connected.

SQL>
```

6. As the AMM user, determine the current settings for the various memory buffers as well as the list of resized operations that were performed since you started your instance.

- a. You can use the `amm_components.sql` script for that purpose.

```
SQL> @amm_components.sql
SQL> set echo on
SQL> set serveroutput on
SQL> set term on
SQL> set lines 200
SQL> set pages 100
SQL> set heading on
SQL> column comp format a20
SQL> column final_size format 99999999
SQL> column oper_type format a9
SQL> set pause on pause "Press [Enter] to continue..."
SQL>
SQL> SELECT substr(COMPONENT, 0, 20) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US
2   FROM v$memory_dynamic_components
```

```
3 WHERE CURRENT_SIZE!=0;
Press [Enter] to continue...
```

- b. To view the query result, press Enter to continue the script.

COMP	CS	US
shared pool	150994944	0
large pool	88080384	0
java pool	4194304	0
streams pool	4194304	0
SGA Target	390070272	0
DEFAULT buffer cache	121634816	4194304
Shared IO Pool	12582912	0
PGA Target	264241152	0

8 rows selected.
SQL> pause Press [Enter] to continue...
Press [Enter] to continue...

- c. View the memory components (ordered by descending START_TIME) by pressing Enter to continue the script.

```
SQL> SELECT substr(COMPONENT,0,20) comp, FINAL_SIZE, OPER_TYPE,
OPER_MODE, status
  2  FROM v$memory_resize_ops
  3 ORDER BY START_TIME desc;
Press [Enter] to continue...
```

- d. To view the query result, press Enter to continue the script.

COMP	FINAL_SIZE	OPER_TYPE	OPER_MODE	STATUS
DEFAULT buffer cache	201326592	GROW	DEFERRED	COMPLETE
large pool	8388608	SHRINK	DEFERRED	COMPLETE
shared pool	150994944	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	121634816	SHRINK		IMMEDIATE COMPLETE
shared pool	146800640	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	130023424	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	142606336	SHRINK		IMMEDIATE COMPLETE
shared pool	142606336	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	146800640	SHRINK		IMMEDIATE COMPLETE
streams pool	4194304	GROW	IMMEDIATE	COMPLETE
shared pool	138412032	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	155189248	SHRINK		IMMEDIATE COMPLETE

```

shared pool          134217728 GROW      IMMEDIATE COMPLETE
shared pool          130023424 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache 159383552 SHRINK    IMMEDIATE COMPLETE
shared pool          125829120 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache 163577856 SHRINK    IMMEDIATE COMPLETE
large pool           88080384 STATIC     COMPLETE
shared pool          121634816 STATIC     COMPLETE
PGA Target           264241152 STATIC     COMPLETE
DEFAULT buffer cache 167772160 INITIALIZING COMPLETE
                                         ING

DEFAULT buffer cache 167772160 STATIC     COMPLETE
KEEP buffer cache    0 STATIC          COMPLETE
RECYCLE buffer cache 0 STATIC          COMPLETE
DEFAULT 2K buffer ca 0 STATIC          COMPLETE
DEFAULT 4K buffer ca 0 STATIC          COMPLETE
DEFAULT 8K buffer ca 0 STATIC          COMPLETE
DEFAULT 16K buffer c 0 STATIC          COMPLETE
DEFAULT 32K buffer c 0 STATIC          COMPLETE
In-Memory Area       0 STATIC          COMPLETE
streams pool         0 STATIC          COMPLETE
SGA Target           390070272 STATIC     COMPLETE
ASM Buffer Cache     0 STATIC          COMPLETE
java pool            4194304 STATIC     COMPLETE

36 rows selected.
SQL> pause Press [Enter] to exit the script...
Press [Enter] to exit the script...

SQL> set pause off
SQL>
SQL>
```

7. Remain connected as the AMM user in your SQL*Plus session and execute the following query. Immediately after that, determine the component sizes and resized operations. You can use the `amm_query1.sql` script for that purpose. What do you observe?
- Execute the `amm_query1.sql` script. You can see that the large pool has a much bigger size, whereas the buffer cache is smaller. This memory transfer was automatically done by the system.

```

SQL> @amm_query1.sql
SQL> select /*+ PARALLEL(s 24) */ count(*) from (select /*+
parallel(s 24) */ a from tabsga s group by a);
```

```
COUNT (*)
-----
100000

SQL>
SQL> column COMP format a20
SQL>
SQL> select substr(COMPONENT, 0, 20) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US from v$memory_dynamic_components where
CURRENT_SIZE!=0;

COMP                      CS          US
-----
shared pool                155189248   0
large pool                 79691776    0
java pool                  4194304     0
streams pool               4194304     0
SGA Target                 390070272   0
DEFAULT buffer cache      125829120   4194304
Shared IO Pool              12582912    0
PGA Target                 264241152   0

8 rows selected.

SQL>
SQL> select substr(COMPONENT, 0, 20) COMP, FINAL_SIZE,
OPER_TYPE, OPER_MODE, status from v$memory_resize_ops order by
START_TIME;

COMP          FINAL_SIZE OPER_TYPE  OPER_MODE STATUS
-----
PGA Target        264241152 STATIC      COMPLETE
DEFAULT 2K buffer ca      0 STATIC      COMPLETE
In-Memory Area            0 STATIC      COMPLETE
RECYCLE buffer cache      0 STATIC      COMPLETE
KEEP buffer cache         0 STATIC      COMPLETE
DEFAULT buffer cache     167772160 STATIC      COMPLETE
DEFAULT buffer cache     167772160 INITIALIZING
ASM Buffer Cache          0 STATIC      COMPLETE
DEFAULT 4K buffer ca      0 STATIC      COMPLETE
DEFAULT 8K buffer ca      0 STATIC      COMPLETE
DEFAULT 16K buffer c       0 STATIC      COMPLETE
```

SGA Target	390070272	STATIC		COMPLETE
streams pool	0	STATIC		COMPLETE
java pool	4194304	STATIC		COMPLETE
shared pool	121634816	STATIC		COMPLETE
DEFAULT 32K buffer c	0	STATIC		COMPLETE
large pool	88080384	STATIC		COMPLETE
shared pool	125829120	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK		IMMEDIATE COMPLETE
shared pool	130023424	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	155189248	SHRINK		IMMEDIATE COMPLETE
shared pool	134217728	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	146800640	SHRINK		IMMEDIATE COMPLETE
shared pool	138412032	GROW	IMMEDIATE	COMPLETE
streams pool	4194304	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK		IMMEDIATE COMPLETE
shared pool	142606336	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	130023424	SHRINK		IMMEDIATE COMPLETE
shared pool	146800640	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	121634816	SHRINK		IMMEDIATE COMPLETE
shared pool	150994944	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	201326592	GROW	DEFERRED	COMPLETE
large pool	8388608	SHRINK	DEFERRED	COMPLETE
shared pool	155189248	GROW	DEFERRED	COMPLETE
DEFAULT buffer cache	197132288	SHRINK		DEFERRED COMPLETE
large pool	79691776	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	192937984	SHRINK		IMMEDIATE COMPLETE
large pool	71303168	GROW	IMMEDIATE	COMPLETE
large pool	67108864	GROW	IMMEDIATE	COMPLETE
large pool	62914560	GROW	IMMEDIATE	COMPLETE
large pool	58720256	GROW	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
large pool	50331648	GROW	IMMEDIATE	COMPLETE
large pool	46137344	GROW	IMMEDIATE	COMPLETE
large pool	41943040	GROW	IMMEDIATE	COMPLETE
large pool	37748736	GROW	IMMEDIATE	COMPLETE
large pool	33554432	GROW	IMMEDIATE	COMPLETE
large pool	29360128	GROW	IMMEDIATE	COMPLETE
large pool	25165824	GROW	IMMEDIATE	COMPLETE
large pool	20971520	GROW	IMMEDIATE	COMPLETE

large pool	16777216	GROW	IMMEDIATE	COMPLETE
large pool	12582912	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	130023424	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	134217728	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	138412032	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	146800640	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	155189248	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	167772160	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	171966464	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	176160768	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	180355072	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	184549376	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	188743680	SHRINK	IMMEDIATE	COMPLETE
large pool	75497472	GROW	IMMEDIATE	COMPLETE

72 rows selected.

SQL>

8. Repeat the query by using the `amm_query2.sql` script. What do you observe?

Possible Answer: The same trend continues.

```
SQL> @amm_query2.sql
SQL> select /*+ PARALLEL(s 25) */ count(*) from (select /*+
parallel(s 25) */ * from tabsga s group by a);

          COUNT(*)
-----
          100000

SQL>
SQL> column COMP format a12
SQL>
SQL> select substr(COMPONENT, 0, 10) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US from v$memory_dynamic_components where
CURRENT_SIZE!=0;

          COMP          CS          US
-----

```

shared pool	155189248	0
large pool	88080384	0
java pool	4194304	0
streams pool	4194304	0
SGA Target	381681664	0
DEFAULT buffer cache	109051904	4194304
Shared IO Pool	12582912	0
PGA Target	272629760	0

8 rows selected.

SQL>

```
SQL> select substr(COMPONENT, 0, 10) COMP, FINAL_SIZE,
OPER_TYPE, OPER_MODE, status from v$memory_resize_ops order by
START_TIME;
```

COMP	FINAL_SIZE	OPER_TYPE	OPER_MODE	STATUS
PGA Target	264241152	STATIC		COMPLETE
DEFAULT 2K buffer ca	0	STATIC		COMPLETE
In-Memory Area	0	STATIC		COMPLETE
RECYCLE buffer cache	0	STATIC		COMPLETE
KEEP buffer cache	0	STATIC		COMPLETE
DEFAULT buffer cache	167772160	STATIC		COMPLETE
DEFAULT buffer cache	167772160	INITIALIZ		COMPLETE
		ING		
ASM Buffer Cache	0	STATIC		COMPLETE
DEFAULT 4K buffer ca	0	STATIC		COMPLETE
DEFAULT 8K buffer ca	0	STATIC		COMPLETE
DEFAULT 16K buffer c	0	STATIC		COMPLETE
SGA Target	390070272	STATIC		COMPLETE
streams pool	0	STATIC		COMPLETE
java pool	4194304	STATIC		COMPLETE
shared pool	121634816	STATIC		COMPLETE
DEFAULT 32K buffer c	0	STATIC		COMPLETE
large pool	88080384	STATIC		COMPLETE
shared pool	125829120	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK		IMMEDIATE COMPLETE
shared pool	130023424	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	155189248	SHRINK		IMMEDIATE COMPLETE
shared pool	134217728	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK		IMMEDIATE COMPLETE

DEFAULT buffer cache	146800640	SHRINK	IMMEDIATE	COMPLETE
shared pool	138412032	GROW	IMMEDIATE	COMPLETE
streams pool	4194304	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
shared pool	142606336	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	130023424	SHRINK	IMMEDIATE	COMPLETE
shared pool	146800640	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	121634816	SHRINK	IMMEDIATE	COMPLETE
shared pool	150994944	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	201326592	GROW	DEFERRED	COMPLETE
large pool	8388608	SHRINK	DEFERRED	COMPLETE
shared pool	155189248	GROW	DEFERRED	COMPLETE
DEFAULT buffer cache	197132288	SHRINK	DEFERRED	COMPLETE
large pool	79691776	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	192937984	SHRINK	IMMEDIATE	COMPLETE
large pool	71303168	GROW	IMMEDIATE	COMPLETE
large pool	67108864	GROW	IMMEDIATE	COMPLETE
large pool	62914560	GROW	IMMEDIATE	COMPLETE
large pool	58720256	GROW	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
large pool	50331648	GROW	IMMEDIATE	COMPLETE
large pool	46137344	GROW	IMMEDIATE	COMPLETE
large pool	41943040	GROW	IMMEDIATE	COMPLETE
large pool	37748736	GROW	IMMEDIATE	COMPLETE
large pool	33554432	GROW	IMMEDIATE	COMPLETE
large pool	29360128	GROW	IMMEDIATE	COMPLETE
large pool	25165824	GROW	IMMEDIATE	COMPLETE
large pool	20971520	GROW	IMMEDIATE	COMPLETE
large pool	16777216	GROW	IMMEDIATE	COMPLETE
large pool	12582912	GROW	IMMEDIATE	COMPLETE
large pool	75497472	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	130023424	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	134217728	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	138412032	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	146800640	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	155189248	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK	IMMEDIATE	COMPLETE

DEFAULT buffer cache	167772160	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	171966464	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	176160768	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	180355072	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	184549376	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	188743680	SHRINK	IMMEDIATE	COMPLETE
SGA Target	381681664	SHRINK	DEFERRED	COMPLETE
DEFAULT buffer cache	117440512	SHRINK	DEFERRED	COMPLETE
PGA Target	272629760	GROW	MANUAL	COMPLETE
DEFAULT buffer cache	192937984	GROW	DEFERRED	COMPLETE
large pool	4194304	SHRINK	DEFERRED	COMPLETE
large pool	8388608	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	184549376	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	180355072	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	176160768	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	171966464	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	167772160	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	188743680	SHRINK	IMMEDIATE	COMPLETE
large pool	12582912	GROW	IMMEDIATE	COMPLETE
large pool	16777216	GROW	IMMEDIATE	COMPLETE
large pool	20971520	GROW	IMMEDIATE	COMPLETE
large pool	25165824	GROW	IMMEDIATE	COMPLETE
large pool	29360128	GROW	IMMEDIATE	COMPLETE
large pool	33554432	GROW	IMMEDIATE	COMPLETE
large pool	37748736	GROW	IMMEDIATE	COMPLETE
large pool	46137344	GROW	IMMEDIATE	COMPLETE
large pool	41943040	GROW	IMMEDIATE	COMPLETE
COMP	FINAL_SIZE	OPER_TYPE	OPER_MODE	STATUS
-----	-----	-----	-----	-----
DEFAULT buffer cache	146800640	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
large pool	50331648	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	155189248	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
large pool	67108864	GROW	IMMEDIATE	COMPLETE
large pool	71303168	GROW	IMMEDIATE	COMPLETE

```

large pool          75497472 GROW    IMMEDIATE COMPLETE
large pool          79691776 GROW    IMMEDIATE COMPLETE
large pool          83886080 GROW    IMMEDIATE COMPLETE
large pool          62914560 GROW    IMMEDIATE COMPLETE
large pool          58720256 GROW    IMMEDIATE COMPLETE
large pool          88080384 GROW    IMMEDIATE COMPLETE
DEFAULT buffer cache 134217728 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 138412032 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 125829120 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 121634816 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 117440512 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 113246208 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 109051904 SHRINK    IMMEDIATE COMPLETE
DEFAULT buffer cache 130023424 SHRINK    IMMEDIATE COMPLETE

119 rows selected.
SQL>

```

9. Still connected as the AMM user in your SQL*Plus session, execute the `amm_query3.sql` script. Immediately afterward, determine the memory component sizes and the list of resize operations. What do you observe?

Possible Answer: The same action of growing and shrinking the memory components

Alternative Answer: The memory grows and shrinks until the memory allocation meets the needs of the database activity, and then remains nearly constant.

```

SQL> @amm_query3.sql
SQL> exec testpga(500000);

PL/SQL procedure successfully completed.

SQL>
SQL> column COMP format a12
SQL>
SQL> select substr(COMPONENT, 0, 10) COMP, CURRENT_SIZE CS,
USER_SPECIFIED_SIZE US from v$memory_dynamic_components where
CURRENT_SIZE!=0;

COMP                  CS      US
-----
shared pool          159383552  0
large pool           4194304   0
java pool            4194304   0
streams pool         4194304   0
SGA Target           377487360  0

```

```

DEFAULT buffer cache 184549376      4194304
Shared IO Pool        12582912      0
PGA Target           276824064     0
8 rows selected.
SQL>
SQL> select substr(COMPONENT, 0, 10) COMP, FINAL_SIZE,
OPER_TYPE, OPER_MODE, status from v$memory_resize_ops order by
START_TIME;

COMP          FINAL_SIZE OPER_TYPE OPER_MODE STATUS
-----
DEFAULT 2K buffer ca      0 STATIC      COMPLETE
RECYCLE buffer cache      0 STATIC      COMPLETE
PGA Target             264241152 STATIC      COMPLETE
In-Memory Area          0 STATIC      COMPLETE
KEEP buffer cache        0 STATIC      COMPLETE
DEFAULT buffer cache    167772160 STATIC      COMPLETE
DEFAULT buffer cache    167772160 INITIALIZ
                           ING      COMPLETE
                                         COMPLETE
shared pool            121634816 STATIC      COMPLETE
large pool              88080384 STATIC      COMPLETE
java pool              4194304 STATIC      COMPLETE
DEFAULT 32K buffer c    0 STATIC      COMPLETE
streams pool            0 STATIC      COMPLETE
SGA Target              390070272 STATIC      COMPLETE
DEFAULT 16K buffer c    0 STATIC      COMPLETE
DEFAULT 8K buffer ca    0 STATIC      COMPLETE
DEFAULT 4K buffer ca    0 STATIC      COMPLETE
ASM Buffer Cache        0 STATIC      COMPLETE
DEFAULT buffer cache   163577856 SHRINK      IMMEDIATE COMPLETE
shared pool              125829120 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache   159383552 SHRINK      IMMEDIATE COMPLETE
shared pool              130023424 GROW      IMMEDIATE COMPLETE
shared pool              134217728 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache   155189248 SHRINK      IMMEDIATE COMPLETE
DEFAULT buffer cache   146800640 SHRINK      IMMEDIATE COMPLETE
streams pool            4194304 GROW      IMMEDIATE COMPLETE
shared pool              138412032 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache   150994944 SHRINK      IMMEDIATE COMPLETE
DEFAULT buffer cache   142606336 SHRINK      IMMEDIATE COMPLETE
shared pool              142606336 GROW      IMMEDIATE COMPLETE
DEFAULT buffer cache   130023424 SHRINK      IMMEDIATE COMPLETE

```

DEFAULT buffer cache	125829120	SHRINK	IMMEDIATE	COMPLETE
shared pool	146800640	GROW	IMMEDIATE	COMPLETE
shared pool	150994944	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	121634816	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	201326592	GROW	DEFERRED	COMPLETE
large pool	8388608	SHRINK	DEFERRED	COMPLETE
DEFAULT buffer cache	197132288	SHRINK	DEFERRED	COMPLETE
shared pool	155189248	GROW	DEFERRED	COMPLETE
large pool	79691776	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	192937984	SHRINK	IMMEDIATE	COMPLETE
large pool	71303168	GROW	IMMEDIATE	COMPLETE
large pool	67108864	GROW	IMMEDIATE	COMPLETE
large pool	62914560	GROW	IMMEDIATE	COMPLETE
large pool	58720256	GROW	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
large pool	50331648	GROW	IMMEDIATE	COMPLETE
large pool	46137344	GROW	IMMEDIATE	COMPLETE
large pool	41943040	GROW	IMMEDIATE	COMPLETE
large pool	37748736	GROW	IMMEDIATE	COMPLETE
large pool	33554432	GROW	IMMEDIATE	COMPLETE
large pool	29360128	GROW	IMMEDIATE	COMPLETE
large pool	25165824	GROW	IMMEDIATE	COMPLETE
large pool	20971520	GROW	IMMEDIATE	COMPLETE
large pool	16777216	GROW	IMMEDIATE	COMPLETE
large pool	12582912	GROW	IMMEDIATE	COMPLETE
large pool	75497472	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	125829120	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	130023424	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	134217728	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	138412032	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	146800640	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	150994944	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	155189248	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	159383552	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	163577856	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	167772160	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	171966464	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	176160768	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	180355072	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	184549376	SHRINK	IMMEDIATE	COMPLETE
DEFAULT buffer cache	188743680	SHRINK	IMMEDIATE	COMPLETE

SGA Target	381681664	SHRINK	DEFERRED	COMPLETE
DEFAULT buffer cache	117440512	SHRINK	DEFERRED	COMPLETE
PGA Target	272629760	GROW	MANUAL	COMPLETE
DEFAULT buffer cache	192937984	GROW	DEFERRED	COMPLETE
large pool	4194304	SHRINK	DEFERRED	COMPLETE
large pool	8388608	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	184549376	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	180355072	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	176160768	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	171966464	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	167772160	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	163577856	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	159383552	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	188743680	SHRINK		IMMEDIATE COMPLETE
large pool	12582912	GROW	IMMEDIATE	COMPLETE
large pool	37748736	GROW	IMMEDIATE	COMPLETE
large pool	33554432	GROW	IMMEDIATE	COMPLETE
large pool	29360128	GROW	IMMEDIATE	COMPLETE
large pool	25165824	GROW	IMMEDIATE	COMPLETE
large pool	20971520	GROW	IMMEDIATE	COMPLETE
large pool	16777216	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	142606336	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	142606336	SHRINK		IMMEDIATE COMPLETE
 COMP FINAL_SIZE OPER_TYPE OPER_MODE STATUS				
-----	-----	-----	-----	-----
DEFAULT buffer cache	155189248	SHRINK		IMMEDIATE COMPLETE
DEFAULT buffer cache	150994944	SHRINK		IMMEDIATE COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
large pool	41943040	GROW	IMMEDIATE	COMPLETE
large pool	46137344	GROW	IMMEDIATE	COMPLETE
large pool	50331648	GROW	IMMEDIATE	COMPLETE
large pool	54525952	GROW	IMMEDIATE	COMPLETE
DEFAULT buffer cache	146800640	SHRINK		IMMEDIATE COMPLETE
large pool	88080384	GROW	IMMEDIATE	COMPLETE
large pool	83886080	GROW	IMMEDIATE	COMPLETE
large pool	79691776	GROW	IMMEDIATE	COMPLETE
large pool	75497472	GROW	IMMEDIATE	COMPLETE
large pool	71303168	GROW	IMMEDIATE	COMPLETE
large pool	67108864	GROW	IMMEDIATE	COMPLETE
large pool	62914560	GROW	IMMEDIATE	COMPLETE
large pool	58720256	GROW	IMMEDIATE	COMPLETE

```

DEFAULT buffer cache 109051904 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 113246208 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 117440512 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 121634816 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 125829120 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 130023424 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 134217728 SHRINK           IMMEDIATE COMPLETE
DEFAULT buffer cache 138412032 SHRINK           IMMEDIATE COMPLETE
SGA Target          377487360 SHRINK             DEFERRED   COMPLETE
DEFAULT buffer cache 104857600 SHRINK           DEFERRED   COMPLETE
PGA Target          276824064 GROW              MANUAL    COMPLETE
shared pool          159383552 GROW              DEFERRED   COMPLETE
DEFAULT buffer cache 100663296 SHRINK           DEFERRED   COMPLETE
large pool           4194304 SHRINK            DEFERRED   COMPLETE
DEFAULT buffer cache 184549376 GROW             DEFERRED   COMPLETE

126 rows selected.

SQL> exit
$
```

10. In Enterprise Manager Cloud Control, look at the memory variations that happened during this practice. What do you observe?

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Log in to Enterprise Manager Cloud Control and navigate to the <code>orcl</code> Database home page.
b.	orcl Database home	Click Performance > Advisors Home > Memory Advisors .
c.	Memory Advisors	Scroll down and examine the two graphs.



Question: What changes do you see to the components of the SGA?

Answer: You should see modifications of the memory components in the second graph, indicating that the large pool grew and shrank.

11. Log out of Enterprise Manager Cloud Control.
12. To clean up your environment, shut down your database instance, restore the original SPFILE, and restart your `orcl` database instance by executing the `amm_cleanup.sh` script.

```
$ cd $LABS/P18
$ ./amm_cleanup.sh
...
Connected to:
...
SQL> SQL>
User dropped.

SQL>
Tablespace dropped.

SQL>
Tablespace dropped.

SQL> SQL> Database closed.
Database dismounted.
```

```
ORACLE instance shut down.  
SQL>  
File created.  
  
SQL> SQL> ORACLE instance started.  
  
Total System Global Area  734003200 bytes  
Fixed Size                  2928728 bytes  
Variable Size                482348968 bytes  
Database Buffers             243269632 bytes  
Redo Buffers                 5455872 bytes  
Database mounted.  
SQL>  
Database altered.  
  
SQL>  
Database altered.  
  
SQL> Disconnected ...  
$
```

Practice 18-3: Monitoring Services

Overview

In this practice, you create and monitor services.

Tasks

In your database there are several running applications. You want to monitor the resources that are being used by each application. Create a service configuration for each application or application function that uses your database.

In this practice, you create the following configuration in the `orcl` database:

Service Name	Usage	Response Time (sec)- Warning/Critical
SERV1	Client service	0.4, 1.0

1. Use the `DBMS_SERVICE` package to create a service called `SERV1`. Then make sure that you add the service name to your `tnsnames.ora` file.
 - a. The recommended method for adding a service name to the `tnsnames.ora` file is to use Oracle Net Manager. For this practice, in the interest of time, execute the `sv1_add.sh` script to add the service name.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
$ cd $LABS/P18
$ ./sv1_add.sh
EDP1 /* the machine name will be different */
$
```

- b. Review the `tnsnames.ora` file in `$ORACLE_HOME/network/admin` to confirm that the following lines are included. The script substituted the output of the `hostname` command for `<hostname>` below. The output of the host name command is shown in step 1a.

```
$ cat $ORACLE_HOME/network/admin/tnsnames.ora
...
SERV1 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)
     (HOST = <hostname>) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = SERV1.example.com)
    )
  )
$
```

- c. Use the DBMS_SERVICE.CREATE_SERVICE procedure to create a service. (The command is entered on one line.)

```
$ sqlplus dba1/oracle_4U as sysdba

SQL> EXEC
DBMS_SERVICE.CREATE_SERVICE('SERV1','SERV1.example.com')

PL/SQL procedure successfully completed.

SQL> exit
```

2. After you have created your service, try connecting to your database by using your service name.

```
$ sqlplus system@serv1
...
Enter password:
ERROR:
ORA-12514: TNS:listener does not currently know of service
requested in connect
descriptor

Enter username: /* enter [ctrl]-[c] to exit */
```

Question: What happens? Why?

Answer: You cannot connect by using your service because, although it is defined, it is not started on your instance.

- a. You can verify this by looking at the DBA_SERVICES view and by looking at the services known to the listener.

```
$ sqlplus dba1/oracle_4U as sysdba

SQL> col name format A20
SQL> col network_name format A30
SQL> select name, network_name from DBA_SERVICES;

NAME          NETWORK_NAME
-----
SYS$BACKGROUND
SYS$USERS
SERV1          SERV1.example.com
orclXDB        orclXDB
orcl           orcl

SQL> host lsnrctl services

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 17-OCT-
2014 14:07:08
```

```
Copyright (c) 1991, 2014, Oracle. All rights reserved.  
Connecting to  
(DESCRIPTION=(ADDRESS=(PROTOCOL=IPC) (KEY=EXTPROC1521)))  
Services Summary...  
Service "em12rep" has 1 instance(s).  
  Instance "em12rep", status READY, has 1 handler(s) for this  
service...  
    Handler(s):  
      "DEDICATED" established:683 refused:0 state:ready  
        LOCAL SERVER  
Service "em12repXDB" has 1 instance(s).  
  Instance "em12rep", status READY, has 1 handler(s) for this  
service...  
    Handler(s):  
      "D000" established:0 refused:0 current:0 max:1022  
state:ready  
      DISPATCHER <machine: EDP1, pid: 18745>  
  
(ADDRESS=(PROTOCOL=tcp) (HOST=edp1.us.oracle.com) (PORT=13016))  
Service "orcl" has 1 instance(s).  
  Instance "orcl", status READY, has 1 handler(s) for this  
service...  
    Handler(s):  
      "DEDICATED" established:34 refused:0 state:ready  
        LOCAL SERVER  
Service "orclXDB" has 1 instance(s).  
  Instance "orcl", status READY, has 1 handler(s) for this  
service...  
    Handler(s):  
      "D000" established:0 refused:0 current:0 max:1022  
state:ready  
      DISPATCHER <machine: EDP1, pid: 10116>  
  
(ADDRESS=(PROTOCOL=tcp) (HOST=edp1.us.oracle.com) (PORT=39588))  
The command completed successfully  
  
SQL>
```

Note: The SERV1 service is NOT listed in the listener services, but it is listed in the DBA_SERVICES view. The orcl and orclXDB services are registered with the listener because the orcl service is included in the SERVICE_NAMES initialization parameter.

Question: How would you make sure that you can connect by using your service?

Answer: You must start your service on your instance.

3. Start the service on your instance and connect to your instance by using your service.

```
SQL> connect dba1/oracle_4U as sysdba
Connected

SQL> EXEC DBMS_SERVICE.START_SERVICE('SERV1')

PL/SQL procedure successfully completed.

SQL> show parameter service

NAME                           TYPE        VALUE
-----
service_names                  string      orcl

SQL> host lsnrctl services

LSNRCTL for Linux: Version 12.1.0.2.0 - Production on 17-OCT-
2014 14:09:57

Copyright (c) 1991, 2014, Oracle. All rights reserved.

Connecting to
(DESCRIPTION=(ADDRESS=(PROTOCOL=IPC)(KEY=EXTPROC1521)))
Services Summary...
Service "SERV1.example.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this
  service...
    Handler(s):
      "DEDICATED" established:0 refused:0 state:ready
      LOCAL SERVER
  Service "em12rep" has 1 instance(s).
    Instance "em12rep", status READY, has 1 handler(s) for this
    service...
      Handler(s):
        "DEDICATED" established:713 refused:0 state:ready
        LOCAL SERVER
  Service "em12repXDB" has 1 instance(s).
    Instance "em12rep", status READY, has 1 handler(s) for this
    service...
      Handler(s):
        "D000" established:0 refused:0 current:0 max:1022
        state:ready
        DISPATCHER <machine: EDP1, pid: 18745>
(ADDRESS=(PROTOCOL=tcp)(HOST=edp1.us.oracle.com)(PORT=13016))
```

```
Service "orcl" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this
service...
  Handler(s):
    "DEDICATED" established:0 refused:0 state:ready
      LOCAL SERVER
Service "orclXDB" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this
service...
  Handler(s):
    "D000" established:0 refused:0 current:0 max:1022
state:ready
      DISPATCHER <machine: EDP1, pid: 19660>

(ADDRESS=(PROTOCOL=tcp) (HOST=edp1.us.oracle.com) (PORT=49410))
The command completed successfully

SQL> connect system@SERV1
Enter password: oracle_4U <<< not displayed

Connected.
SQL> exit
```

4. Create a workload for the SERV1 service. You will create a user for this activity and start a workload.
 - a. Execute the sv1_load.sh script as SYSDBA. This script creates a new SV_USER user.

```
$ cd $LABS/P18
$ ./sv1_load.sh

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

SQL> SQL> 2      3
User created.

SQL> SQL>
Grant succeeded.
$
```

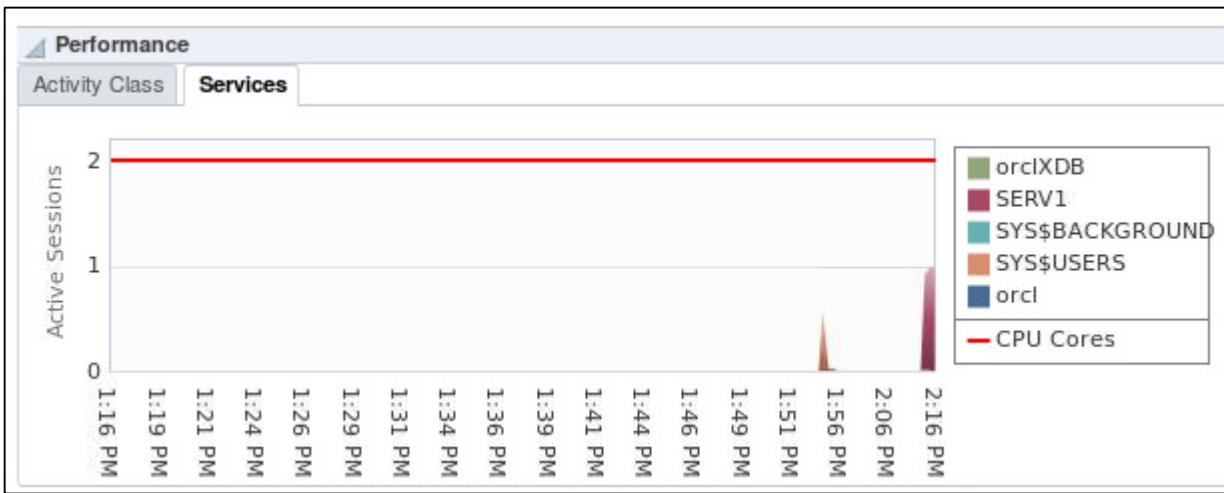
- b. Connect to your instance as the `sv_user` user using the `SERV1` service. Create workload activity by executing the `sv1_load2.sql` script. If this script finishes before you completed the next step, then use the `sv1_sel.sql` script to execute the following query: `SELECT COUNT(*) FROM DBA_OBJECTS, DBA_OBJECTS, DBA_OBJECTS`

Note: Do not wait for the script to complete before proceeding to the next step.

```
$ sqlplus sv_user@SERV1
...
Enter password: oracle_4U <<< not displayed
Connected to:
...
SQL> @sv1_load2.sql
SQL> DECLARE
 2  t number;
 3  BEGIN
 4  for i in 1..2000 loop
 5    select count(*) into t from dba_objects;
 6  end loop;
 7  END;
 8  /
```

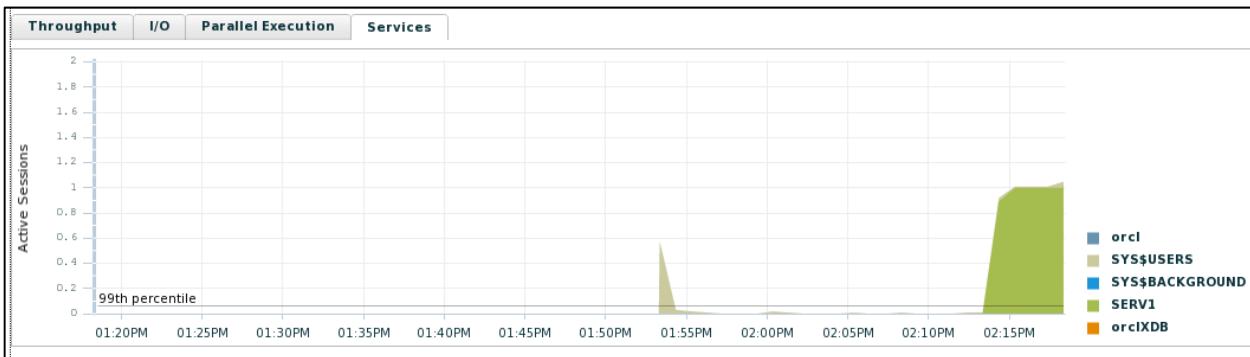
5. After the execution starts, access the Top Consumers page from the Performance tabbed page in Cloud Control, and determine the amount of resources `SERV1` is using. Also, check the statistics on your service with `V$SERVICE_STATS` from a SQL*Plus session, connected as `SYSDBA`.

Step	Window/Page Description	Choices or Values
a.	Cloud Control	Log in to Enterprise Manager Cloud Control and navigate to the <code>orcl</code> Database home page.
b.	orcl Database	In the Performance section, view the Services tab.

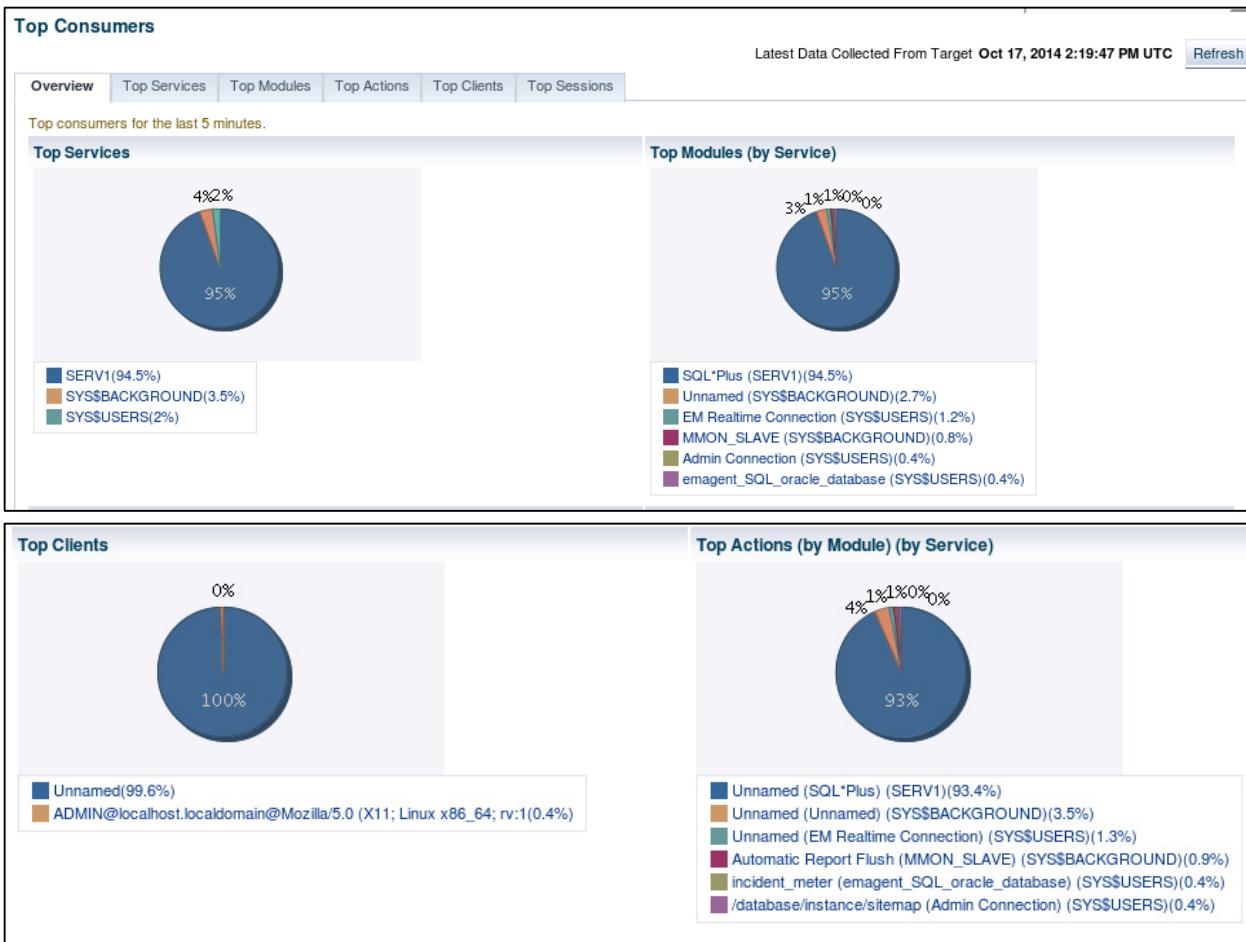


An Active Session graph with the activity aggregated by service name is displayed. The network service name of each connection is recorded as a separate service. So all the connections made without a service name are aggregated, as are all the connections made as SERV1.

Step	Window/Page Description	Choices or Values
c.	orcl Database home	Click Performance > Performance Home .
d.	Performance Home	Scroll down to view the Active Session graph aggregated by service by clicking the Services tab.



Step	Window/Page Description	Choices or Values
e.	Performance Home	Scroll down to Additional Links. Click Top Consumers .
f.	Top Consumers: Overview tab	Review the graphs.



The names and number of services listed in the Top Services Graph depends on the number and type of connections to the database.

Step	Window/Page Description	Choices or Values
g.	Top Consumers: Overview	Click the Top Services tab.
h.	Top Consumers:Top Services	Click the SERV1 link in Service column.
i.	Service: SERV1: Modules tab	Click the Statistics tab.
j.	Service: SERV1: Statistics tab	View detailed statistics for the SERV1 service.

Service: SERV1		
Latest Data Collected From Target Oct 17, 2014 2:22:02 PM Refresh		
Modules	Activity	Statistics
		Previous 1-25 of 28 Next 3
Name	Delta Value	Cumulative Value
logons cumulative	0	2
user calls	0	32
DB time	0	262022480
DB CPU	0	240662416
parse count (total)	0	141
parse time elapsed	0	94789
execute count	0	2262
sql execute elapsed time	0	261911376
opened cursors cumulative	0	2257
session logical reads	0	8569217
physical reads	0	12
physical writes	0	0
redo size	0	1380

- If the `sv1_load2.sql` script finishes before you complete this step, then use the `sv1_sel.sql` script to continue creating a workload. When you have completed the tasks, make sure that you stop your running workload by pressing **Ctrl + C** in your terminal window.

```
SQL> @sv1_sel.sql
SQL> select count(*) from dba_objects,dba_objects,dba_objects
      *
ERROR at line 1:
ORA-01013: user requested cancel of current operation

SQL> exit
```

- Clean up from this practice by running the `sv1_cleanup.sh` script in the `$LABS/P18` directory.

```
$ cd $LABS/P18
$ ./sv1_cleanup.sh
```

Practices for Lesson 19: Managing Performance: SQL Tuning

Chapter 19

Practices for Lesson 19: Overview

Lesson Overview

By default, Automatic SQL Tuning executes automatically during each nightly maintenance window. For this practice, you simulate the execution of Automatic SQL Tuning, and explore its results.

Practice 19-1: Using Automatic SQL Tuning

Overview

In this practice, you manually launch Automatic SQL Tuning to automatically tune a small application workload. You then investigate the outcome and configuration possibilities.

Assumptions

ADMIN Super Administrator user has been created in Enterprise Manager Cloud Control.

DBA1 user with SYSDBA privileges has been created in orcl database.

Tasks

1. In Cloud Control, Configure the Automatic SQL Tuning Task to Implement SQL Profiles Automatically.

Step	Window/Page Description	Choices or Values
a.	EMCC Cloud Control	Login as ADMIN user.
b.	Summary page	Navigate to the orcl database home page.
c.	orcl database home	Click Administration > Oracle Scheduler > Automated Maintenance Tasks .
d.	Database Login	Login with SYSDBA credentials to database. Use DBA1/oracle_4U AS SYSDBA
e.	Automated Maintenance Tasks	Verify Status is Enabled . Click Configure .

Automated Maintenance Tasks
 Status Enabled [Configure](#)
TIP If the status is Disabled, there are no future windows.

Step	Window/Page Description	Choices or Values
f.	Automated Maintenance Tasks Configuration	Click Configure next to Automatic SQL Tuning.

Automated Maintenance Tasks Configuration
 Global Status Enabled Disabled
Task Settings
 Optimizer Statistics Gathering Enabled Disabled [Configure](#)
 Segment Advisor Enabled Disabled
 Automatic SQL Tuning Enabled Disabled [Configure](#)

Step	Window/Page Description	Choices or Values
g.	Automatic SQL Tuning Settings	Click Yes for Automatic Implementation of SQL Profiles. Click Show SQL .

Automated Maintenance Tasks Configuration >
Automatic SQL Tuning Settings

Maximum Time Spent Per SQL During Tuning (sec)

Automatic Implementation of SQL Profiles Yes No

Maximum SQL Profiles Implemented Per Execution

Maximum SQL Profiles Implemented (Overall)

Step	Window/Page Description	Choices or Values
h.	Show SQL	View the SQL statement. Click Return .

Show SQL

Return

```
BEGIN
dbms_sqltune.set_auto_tuning_task_parameter(
'ACCEPT_SQL_PROFILES', 'TRUE');
END;
```

Step	Window/Page Description	Choices or Values
i.	Automatic SQL Tuning Settings	Click Apply .

You should receive a success message.

- Review and execute the `$LABS/P19/ast_setup.sh` script .This script creates the AST user, turns off automatic maintenance tasks, and drops any existing profiles on queries executed by the AST user.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
$ cd $LABS/P19
$ cat ast_setup.sh

#!/bin/bash
# For training only - execute as oracle OS user

sqlplus / as sysdba <<EOF!
```

```
set echo on

drop user ast cascade;
create user ast identified by "oracle_4U";
grant dba to ast;

alter system flush shared_pool;
--
-- Turn off AUTOTASK
--

alter system set "_enable_automatic_maintenance"=0 scope=MEMORY;

--
-- Clear out old executions of auto-sqltune
--

exec dbms_sqltune.reset_tuning_task('SYS_AUTO_SQL_TUNING_TASK');

--
-- Drop any profiles on AST queries
--

declare
  cursor prof_names is
    select name from dba_sql_profiles where sql_text like
'%AST%';
begin
  for prof_rec in prof_names loop
    dbms_sqltune.drop_sql_profile(prof_rec.name);
  end loop;
end;
/
EOF!
$
```

```
$ ./ast_setup.sh

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

SQL>
User created.
```

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```
SQL>
Grant succeeded.

SQL> SQL>
System altered.

SQL> SQL> SQL> SQL>
System altered.

SQL> SQL> SQL> SQL> SQL>
PL/SQL procedure successfully completed.

SQL> SQL> SQL> SQL> SQL> 2   3   4   5   6   7   8   9
PL/SQL procedure successfully completed.

SQL> SQL>
$
```

3. Execute the `ast_workload_stream.sh` script. This script executes a query that is not correctly optimized multiple times. The query in question uses hints that force the optimizer to pick a suboptimal execution plan. The script executes for approximately 60 seconds.

```
$ ./ast_workload_stream.sh

Mon Oct 20 09:05:14 UTC 2014
Mon Oct 20 09:06:22 UTC 2014
$
```

4. Automatic SQL Tuning is implemented by using an automated task that runs during maintenance windows. However, you are not going to wait for the next maintenance window to open. This might take too long. Instead, you will force the opening of your next maintenance window now. This will automatically trigger the Automatic SQL Tuning task. Review and execute the `ast_run.sh` script to do that. It takes about 10 minutes for the script to execute.

```
$ cat ast_run.sh
#!/bin/bash
# For training only - execute as oracle OS user
date

sqlplus / as sysdba <<EOF!
set echo on
set serveroutput on

exec dbms_workload_repository.create_snapshot;
```

```
variable window varchar2(20);
begin
  select upper(to_char(sysdate,'fmday'))||'_WINDOW' into :window
from dual;
end;
/
print window;

--
-- Open the corresponding maintenance window, but with other
clients disabled
--
alter system set "_enable_automatic_maintenance"=1 SCOPE=MEMORY
/
exec dbms_auto_task_admin.disable( -
  'auto optimizer stats collection', null, :window);

exec dbms_auto_task_admin.disable( -
  'auto space advisor', null, :window);

exec dbms_scheduler.open_window(:window, null, true);

--
-- Close the maintenance window when sqltune is done
--
exec dbms_lock.sleep(60);

declare
  running number;
begin
  loop
    select count(*)
    into   running
    from   dba_advisor_executions
    where  task_name = 'SYS_AUTO_SQL_TUNING_TASK' and
           status = 'EXECUTING';
    if (running = 0) then
      exit;
    end if;
    dbms_lock.sleep(60);
  end loop;
  dbms_scheduler.close_window(:window);
end;
```

```
/  
alter system set "_enable_automatic_maintenance"=1 SCOPE=MEMORY  
  
-- Re-enable the other guys so they look like they are enabled  
in EM.  
-- Still they will be disabled because we have set the  
underscore.  
  
--  
  
exec dbms_auto_task_admin.enable( -  
    'auto optimizer stats collection', null, :window);  
  
exec dbms_auto_task_admin.enable( -  
    'auto space advisor', null, :window);  
  
EOF!  
  
date  
  
$
```

```
$ ./ast_run.sh  
Mon Oct 20 09:08:24 UTC 2014  
...  
Connected to:  
...  
  
SQL> SQL> SQL> SQL>  
PL/SQL procedure successfully completed.  
  
SQL> SQL> SQL> 2      3      4  
PL/SQL procedure successfully completed.  
  
SQL>  
WINDOW  
-----  
MONDAY_WINDOW  
  
SQL> SQL> SQL> SQL> SQL> 2  
System altered.  
  
SQL> >
```

```
PL/SQL procedure successfully completed.

SQL> SQL> >
PL/SQL procedure successfully completed.

SQL> SQL>
PL/SQL procedure successfully completed.

SQL> SQL> SQL> SQL> SQL>
PL/SQL procedure successfully completed.

SQL> SQL> 2      3      4      5      6      7      8      9      10     11     12
13     14     15     16     17
PL/SQL procedure successfully completed.

SQL> 2
System altered.

SQL> SQL> SQL> SQL> SQL> SQL> >
PL/SQL procedure successfully completed.

SQL> SQL> >
PL/SQL procedure successfully completed.

SQL> SQL>
Mon Oct 20 09:14:30 UTC 2014
$
```

Some of your output, such as the WINDOW, may look different.

5. Execute the `ast_workload_stream.sh` script again. What do you observe?

You should see that the execution time for `ast_workload_stream.sh` is much faster than the original execution. This is probably due to the fact that Automatic SQL Tuning implemented a profile for your statement automatically.

```
$ ./ast_workload_stream.sh
Mon Oct 20 10:10:16 UTC 2014
Mon Oct 20 10:10:36 UTC 2014
$
```

6. Log in as the `AST` user and force the creation of an AWR snapshot.

```
$ sqlplus ast
Enter password: oracle_4U <<< not displayed
SQL> exec dbms_workload_repository.create_snapshot;
PL/SQL procedure successfully completed.
```

```
SQL> exit
$
```

7. How can you confirm that a SQL Profile was automatically implemented?
 - a. In Enterprise Manager Cloud Control, navigate to **Administration > Oracle Scheduler > Automated Maintenance Tasks**.
 - b. Click **Automatic SQL Tuning**.
 - c. On the Automatic SQL Tuning Result Summary page, view the tuning results.

[Advisor Central >](#)

Automatic SQL Tuning Result Summary

The Automatic SQL Tuning runs during system maintenance windows as an automated maintenance task, searching for way

Task Status

Automatic SQL Tuning (SYS_AUTO_SQL_TUNING_TASK) is currently Enabled [Configure](#)

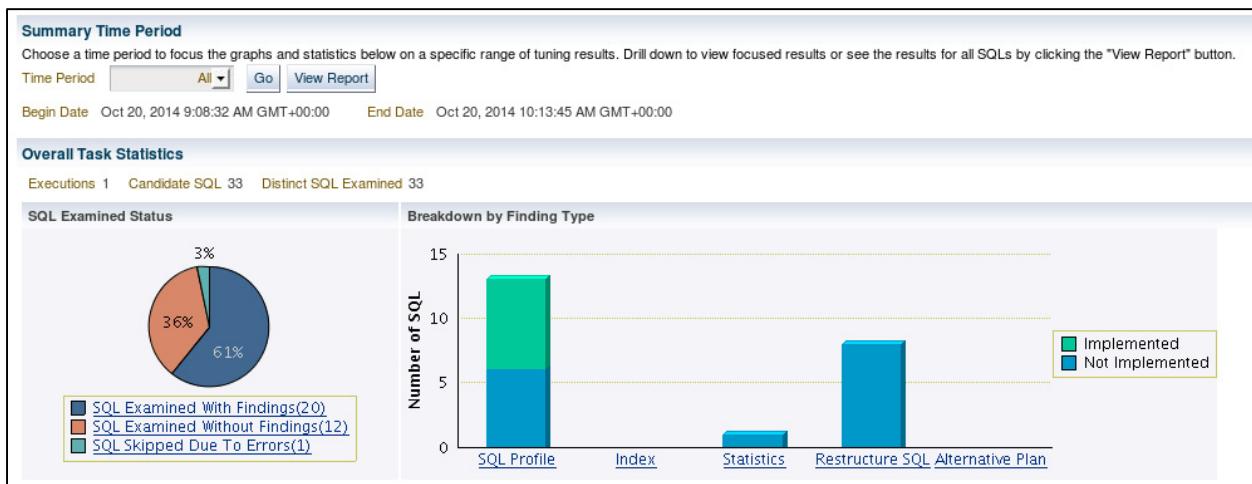
Automatic Implementation of SQL Profiles is currently Enabled [Configure](#)

Key SQL Profiles 0

TIP Key SQL Profiles were verified to yield at least a 3X performance improvement and would have been implemented

SPA Validation Results [Navigate to SPA home](#)

The task has already run in one maintenance window and has results ready to be viewed.



- d. Look at the graphs on the Automatic SQL Tuning Result Summary page. (If you do not see any graphs, return to step 5, execute the work load twice, and then continue with step 6 and 7.)
- e. Focus on understanding the pie chart and the bar graph next to it. You should be able to get a sense of the general findings, as well as the number of SQL profiles implemented by the task.
- f. In the Summary Time Period section, Click **View Report** to see a detailed SQL-level report.

- g. Find and select the SQL statement that ran in the AST schema.

Note: The Thumbs Up icon means that the profile was implemented.

Advisor Central > SQL Tuning Summary:SYS.SYS_AUTO_SQL_TUNING_TASK >
Automatic SQL Tuning Result Details: All Analyzed SQLs

Begin Date Oct 20, 2014 9:08:32 AM GMT+00:00 End Date Oct 20, 2014 10:17:40 AM GMT+00:00

Recommendations

Only profiles that significantly improve SQL performance were implemented.

		View Recommendations	Implement All SQL Profiles	Validate All Profiles with SPA				
Select	SQL Text	Parsing Schema	SQL ID	Weekly DB Time Benefit(sec) ▾	Per-Execution % Benefit	Statistics	SQL Profile	
<input checked="" type="radio"/>	select /*+ USE_NL(s c) FULL(s) FULL(c) A... AST	AST	by9m5m597zh19	45.05	98	(98%)		
<input type="radio"/>	SELECT 1, status, ",archiver, databas...	DBSNMP	gj5r9jj2xad7f	14.17	99	(99%)		

- h. Click **View Recommendations**.

- i. Click the **Compare Explain Plans** eyeglass icon for the SQL Profile entry.

Advisor Central > SQL Tuning Summary:SYS.SYS_AUTO_SQL_TUNING_TASK > SQL Tuning Details:SYS.SYS_AUTO_SQL_TUNING_TASK >
Recommendations for SQL ID:by9m5m597zh19

Logged in as DBA1 Return

Only one recommendation should be implemented.

SQL Information

SQL Text select /*+ USE_NL(s c) FULL(s) AST */ c.cust_id, sum(s.quantity_sold) from sh.sales s, sh.customers c where s.cust_id = c.cust_id and c.cust_id < 2 group by c.cust_id

Select Recommendation

		Original Explain Plan (Annotated)							
	Type	Findings	Recommendations		Rationale	Benefit (%)	Other Statistics	New Explain Plan	Compare Explain Plans
<input checked="" type="radio"/>	SQL Profile	A potentially better execution plan was found for this statement.	The SQL profile "SYS_SQLPROF_01492cd0fe310000" currently has status "ENABLED".		SQL profile "SYS_SQLPROF_01492cd0fe310000" was created automatically for this statement.	98.98			

- j. Scroll down the page.

- k. Look at the old and new explain plans for the query.

Original Explain Plan (Annotated)

Indicates an adjustment from the original plan by the SQL Tuning Advisor
Plan Hash Value 4005616876

[Expand All](#) [Collapse All](#)

Operation	Line ID	Object	Object Type	Order	Rows	Bytes	Cost	Time	CPU Cost	I/O Cost
SELECT STATEMENT	0			6	0.013	939	1	277,364,864	932	
HASH GROUP BY	1			5	0.013	939	1	277,364,864	932	
NESTED LOOPS	2			4	0.013	938	1	237,657,216	932	
TABLE ACCESS FULL	3	SH.CUSTOMERS	TABLE	1	0.005	423	1	22,145,352	422	
PARTITION RANGE ALL	4			3	0.008	515	1	215,511,872	510	
TABLE ACCESS FULL	5	SH.SALES	TABLE	2	0.008	515	1	215,511,872	510	

New Explain Plan With SQL Profile										
Plan Hash Value 34974602										
Expand All Collapse All										
Operation	Line ID	Object	Object Type	Order	Rows	Bytes	Cost	Time	CPU Cost	I/O Cost
▽ SELECT STATEMENT	0			8		0.013	56	1	40,148,420	55
▽ HASH GROUP BY	1			7		0.013	56	1	40,148,420	55
▽ NESTED LOOPS	2			6		0.013	55	1	440,778	55
▽ PARTITION RANGE ALL	3			4		0.008	55	1	438,828	55
▽ TABLE ACCESS BY LOCAL INDEX ROWID BATCHED	4	SH.SALES	TABLE	3		0.008	55	1	438,828	55
▽ BITMAP CONVERSION TO ROWIDS	5			2						
BITMAP INDEX RANGE SCAN	6	SH.SALES_CUST_BIX	INDEX (BITMAP)	1						
INDEX UNIQUE SCAN	7	SH.CUSTOMERS_PK	INDEX (UNIQUE)	5		0.005	0	1	1,950	0

- I. Then click the “Recommendations for SQL ID” locator link (the last of the breadcrumbs on top of the page) to return to the previous screen.
- m. Investigate a SQL profile. While still on the “Recommendations for SQL_ID” page, click the **SQL Text** link to go to the SQL Details page for this SQL.
- n. On the SQL Details – Tuning History page note the link to **SYS_AUTO_SQL_TUNING_TASK** that is there to show that the SQL was tuned by this tuning task.

Top Activity > SQL Details: by9m5m597zh19
SQL Details: by9m5m597zh19

Logged in as DBA1

Switch to SQL ID Go View Data Historical Refresh SQL Worksheet Actions SQL Details Active Report Go

Text

```
select /*+ USE_NL(s c) FULL(s) FULL(c) AST */ c.cust_id, sum(s.quantity_sold)
  from sh.sales s, sh.customers c
 where s.cust_id = c.cust_id and c.cust_id < 2 group by c.cust_id
```

Details

Select the plan hash value to see the details below. Plan Hash Value All Optimizer Statistics Diff Report There are multiple plans found for this SQL statement.

Statistics Activity Plan Plan Control Tuning History SQL Monitoring

SQL Tuning History
The following SQL tuning tasks provide the recommendations to tune this SQL statement.

Advisor Task Name	Task Owner	Task Completion
SYS_AUTO_SQL_TUNING_TASK	SYS	Oct 20, 2014 9:14:23 AM

- o. Click the **Plan Control** tab.
- p. Note that a profile was created automatically for this SQL. The type of AUTO means it was automatically created.

Details

Select the plan hash value to see the details below. Plan Hash Value All Optimizer Statistics Diff Report There are multiple plans found for this SQL statement.

Statistics Activity Plan Plan Control Tuning History SQL Monitoring

SQL Profiles and SQL Patches
A SQL Profile contains additional information(auxiliary statistics) that aids the optimizer to select the optimal execution plan of a particular SQL statement. A SQL Patch is automatically generated to work around the issue.

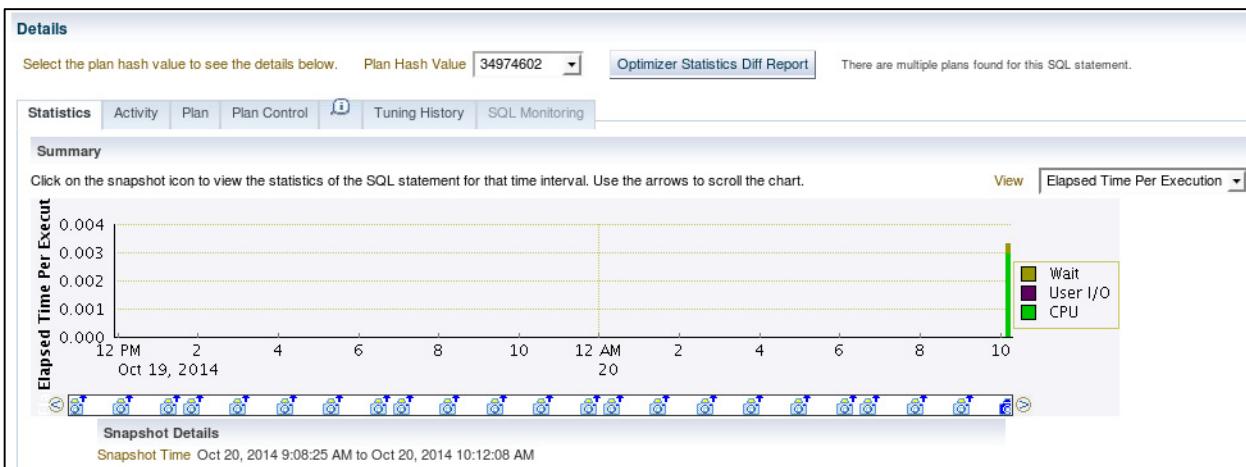
Change Category	Delete	Disable/Enable			
Select	Name	Type	Category	Status	Created
<input checked="" type="radio"/>	SYS_SQLPROF_01492cd0fe310000	AUTO	DEFAULT	ENABLED	Oct 20, 2014 9:08:54 AM

SQL Plan Baseline
A SQL Plan Baseline is an execution plan deemed to have acceptable performance for a given SQL statement.

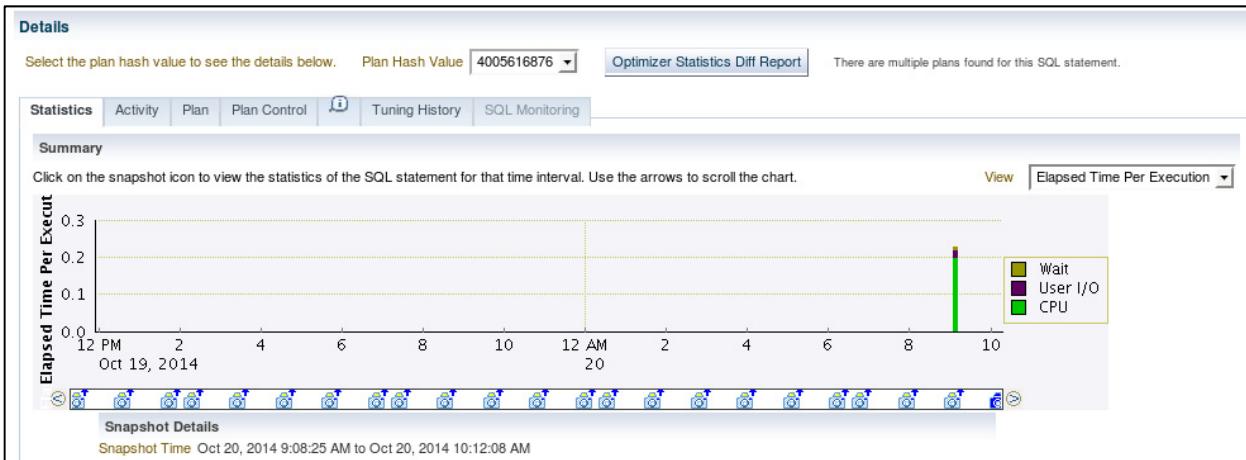
Select	Name	Fix	Accept	Auto Purge	Enabled	Created
(No data)						

- q. Click the **Statistics** tab to take a look at the execution history for this SQL.

- r. Select one of the plan hash values from the pull down Plan Hash Values. What is the time of the execution, and Elapsed Time per Execution?



- s. Select the other plan hash value from the pull down Plan Hash Values. What is the time of the execution, and Elapsed Time per Execution?



- t. Which of the two executed first? Which one executed more quickly?
The hash value 4005616876 in the example executed first, and the second hash value executed more quickly.
- u. Select All in the Plan Hash Values. This shows the improved plan and the original in the same graph. The bar graph for the second run with the SQL Profile applied may be so small as to be almost invisible.
8. Generate a text report for more in-depth information. From the command line, execute the `ast_task_report.sh` script. What do you observe?
- a. Notice the first queries that fetch the execution name and object number from the advisor schema, followed by the final query that gets the text report. In the text report, look for the section about the SQL profile finding and peruse the Validation Results section. This shows you the execution statistics observed during test-execute and allows you to get a better sense of the profile's quality. You can also use the `report_auto_tuning_task` API to get reports that span multiple executions of the task.

```
$ cat ast_task_report.sh
#!/bin/bash
```

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```
# For training only - execute as oracle OS user

sqlplus / as sysdba <<EOF!
set echo on
set long 1000000000
set longchunksize 1000
set serveroutput on

--
-- Check the execution names
--

alter session set nls_date_format = 'MM/DD/YYYY HH24:MI:SS';

select execution_name, status, execution_start
  from dba_advisor_executions
 where task_name = 'SYS_AUTO_SQL_TUNING_TASK'
   order by execution_start;

variable last_exec varchar2(30);

begin
  select max(execution_name) keep (dense_rank last order by
execution_start)
    into :last_exec
   from dba_advisor_executions
  where task_name = 'SYS_AUTO_SQL_TUNING_TASK';
end;
/

print :last_exec

--
-- Find the object ID for query AST with sql_id by9m5m597zh19
--

variable obj_id number;

begin
  select object_id
    into :obj_id
   from dba_advisor_objects
  where task_name = 'SYS_AUTO_SQL_TUNING_TASK' and
        execution_name = :last_exec and
        type = 'SQL' and
```

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```
        attr1 = 'by9m5m597zh19';
end;
/

print :obj_id

--
-- Get a text report to drill down on this one query
--

set pagesize 0
select dbms_sqltune.report_auto_tuning_task(
    :last_exec, :last_exec, 'TEXT', 'TYPICAL', 'ALL', :obj_id)
from dual;

EOF!

$
```

```
$ ./ast_task_report.sh
SQL*Plus: Release 12.1.0.2.0 Production on Mon Oct 20 10:34:13
2014

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics, Real
Application Testing
and Unified Auditing options

SQL> SQL> SQL> SQL> SQL> SQL> SQL> SQL>
Session altered.

SQL> SQL> 2      3      4
EXECUTION_NAME
-----
-----
STATUS          EXECUTION_START
-----
-----
EXEC_708
COMPLETED      10/20/2014 09:08:32
```

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

SQL> SQL>
LAST_EXEC
-----
-----
EXEC_708

SQL> SQL> SQL> SQL> SQL> SQL>      2      3      4      5      6      7
8      9     10
PL/SQL procedure successfully completed.

SQL> SQL>
OBJ_ID
-----
4

SQL> SQL> SQL> SQL> SQL> SQL>      2      3  GENERAL INFORMATION
SECTION
-----
-----
Tuning Task Name          : SYS_AUTO_SQL_TUNING_TASK
Tuning Task Owner         : SYS
Workload Type              : Automatic High-Load SQL
Workload
Scope                      : COMPREHENSIVE
Global Time Limit (seconds) : 3600
Per-SQL Time Limit (seconds) : 1200
Completion Status          : COMPLETED
Started at                 : 10/20/2014 09:08:32
Completed at                : 10/20/2014 09:14:23
Number of Candidate SQLs   : 33
Cumulative Elapsed Time of SQL (s) : 6302

-----
Object ID : 4
Schema Name: AST
SQL ID      : by9m5m597zh19
SQL Text    : select /*+ USE_NL(s c) FULL(s) FULL(c) AST */ 
c.cust_id,
```

```
        sum(s.quantity_sold) from sh.sales s, sh.customers c
where
      s.cust_id = c.cust_id and c.cust_id < 2 group by
c.cust_id

-----
-----
FINDINGS SECTION (1 finding)
-----
-----

1- SQL Profile Finding (see explain plans section below)
-----
A potentially better execution plan was found for this
statement.
SQL profile "SYS_SQLPROF_01492cd0fe310000" was created
automatically for
this statement.

Recommendation (estimated benefit: 98.98%)
-----
- An automatically-created SQL profile is present on the
system.
  Name:   SYS_SQLPROF_01492cd0fe310000
  Status: ENABLED

Validation results
-----
The SQL profile was tested by executing both its plan and the
original plan
and measuring their respective execution statistics. A plan
may have been
only partially executed if the other could be run to
completion in less time.

          Original Plan    With SQL Profile  % Improved
-----  -----  -----
Completion Status:           COMPLETE      COMPLETE
Elapsed Time (s):            .367508     .000167    99.95 %
CPU Time (s):                .205302     .0002      99.9 %
User I/O Time (s):           .007748      0       100 %
Buffer Gets:                  3142        32      98.98 %
Physical Read Requests:      13          0       100 %
Physical Write Requests:     0           0       100 %
```

Physical Read Bytes:	4142421	0	100 %
Physical Write Bytes:	0	0	
Rows Processed:	0	0	
Fetches:	0	0	
Executions:	1	1	

Notes

-
1. Statistics for the original plan were averaged over 3 executions.
 2. Statistics for the SQL profile plan were averaged over 10 executions.
-
-

EXPLAIN PLANS SECTION

1- Original With Adjusted Cost

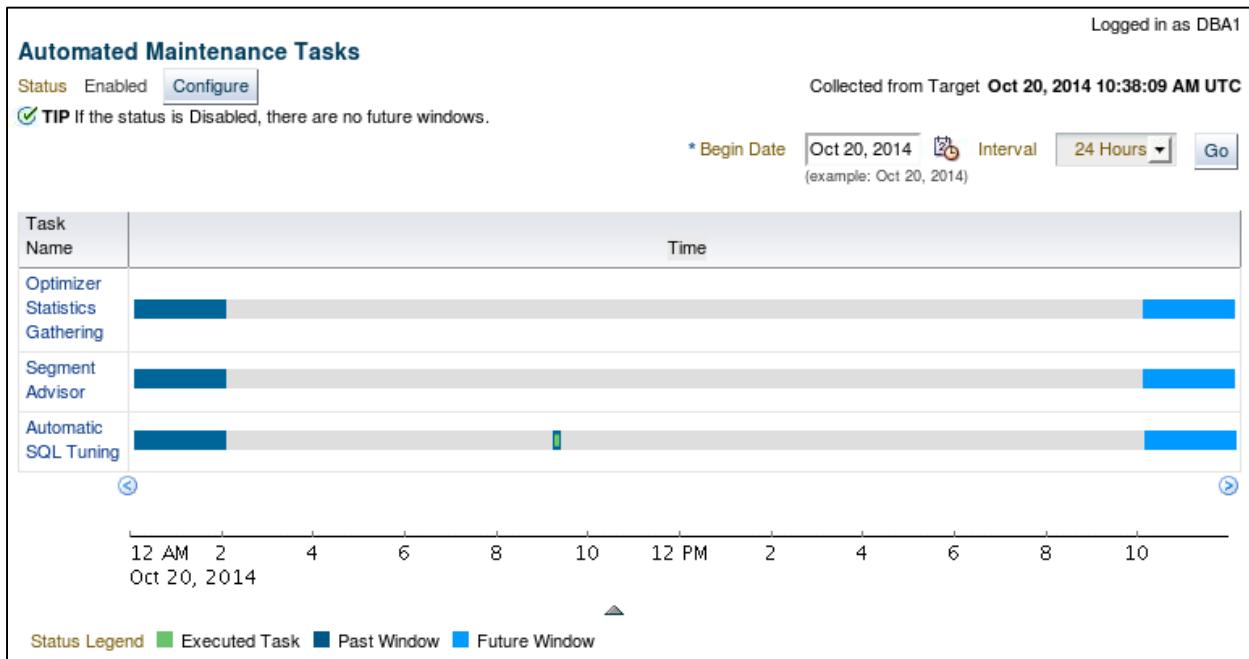
Plan hash value: 4005616876

Id (%CPU)	Operation Time	Name	Rows	Bytes	Cost
Pstart	Pstop				
0 (1)	SELECT STATEMENT 00:00:0		1	13	939
1					
1 (1)	HASH GROUP BY 00:00:0		1	13	939
1					
1 (1)	NESTED LOOPS 00:00:0		1	13	938
1					
* 3 (1)	TABLE ACCESS FULL 00:00:0	CUSTOMERS	1	5	423
1					

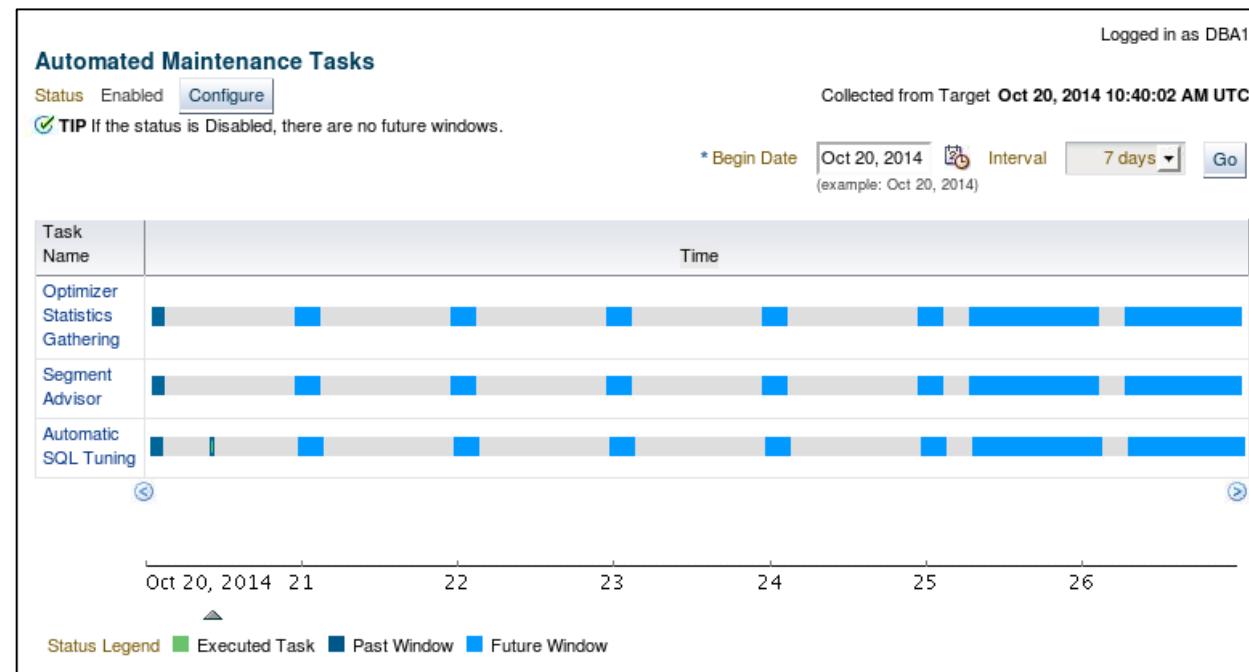
		PARTITION RANGE ALL			1	8	515	(1)
00:00:0	1	1	28					
00:00:0	*	5	TABLE ACCESS FULL	SALES	1	8	515	(1)
00:00:0	1	1	28					
<hr/>								
<hr/>								
<hr/>								
Predicate Information (identified by operation id):								
<hr/>								
3 - filter("C"."CUST_ID"><2)								
5 - filter("S"."CUST_ID"><2 AND "S"."CUST_ID"="C"."CUST_ID")								
2- Using SQL Profile								
<hr/>								
Plan hash value: 34974602								
<hr/>								
<hr/>								
<hr/>								
Id	Operation				Name			
Rows								
Bytes	Cost	(%CPU)	Time		Pstart	Pstop		
1	0	SELECT STATEMENT						
1	13	56 (2)	00:00:01					
1	1	HASH GROUP BY						
1	13	56 (2)	00:00:01					
1	2	NESTED LOOPS						
1	13	55 (0)	00:00:01					
1	3	PARTITION RANGE ALL						
1	8	55 (0)	00:00:01	1	28			
1	4	TABLE ACCESS BY LOCAL INDEX ROWID BATCHED		SALES				
1	8	55 (0)	00:00:01	1	28			

```
| 5 |           BITMAP CONVERSION TO ROWIDS          |
|   |           |           |           |           |
| * 6 |           BITMAP INDEX RANGE SCAN           | SALES_CUST_BIX
|   |           |           |           |           |
|   |           |           |           1 |           28 |
| * 7 |           INDEX UNIQUE SCAN             | CUSTOMERS_PK
|   1 |
| 5 |           0  (0) | 00:00:01 |           |           |
-----  
-----  
-----  
  
Predicate Information (identified by operation id):  
-----  
  
6 - access("S"."CUST_ID"><2)  
    filter("S"."CUST_ID"><2)  
7 - access("S"."CUST_ID"="C"."CUST_ID")  
    filter("C"."CUST_ID"><2)  
  
-----  
-----  
  
SQL> SQL> Disconnected from Oracle Database 12c Enterprise  
Edition Release 12.1.0.2.0 - 64bit Production  
With the Partitioning, OLAP, Advanced Analytics, Real  
Application Testing  
and Unified Auditing options
```

9. Investigate configuring Automatic SQL Tuning with Cloud Control.
 - a. While you are logged in to the `orc1` database target as the `DBA1` user, navigate to **Administration > Oracle Scheduler > Automated Maintenance Tasks**.
 - b. The chart shows times in the past when each client was executed, and times in the future when they are scheduled to run again.



- c. Select **7 days** in the Interval menu and click **Go** to see an entire week's worth of data.



- d. Click the **Configure** button. On the Automated Maintenance Tasks Configuration page, you can disable individual clients and change which windows they run in.
e. Disable the Automatic SQL Tuning client entirely and click **Show SQL**.

```
BEGIN
dbms_auto_task_admin.disable(client_name => 'sql tuning advisor',
operation => NULL, window_name => NULL);
END;
```

- f. Review the command and then click **Return**.

- g. On the Automated Maintenance Tasks Configuration page, click **Apply**. You should receive a success message.
- h. Click the **Automated Maintenance Tasks** locator link at the top of the page
- i. Notice the forbidden sign right next to the task name.

Task Name	
Optimizer Statistics Gathering	
Segment Advisor	
Automatic SQL Tuning	

- j. Click **Configure**.
- k. **Enable** the Automatic SQL Tuning task.

Automated Maintenance Tasks > Automated Maintenance Tasks

Automated Maintenance Tasks Configuration

Global Status Enabled Disabled

Task Settings

Optimizer Statistics Gathering	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	Configure
Segment Advisor	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
Automatic SQL Tuning	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	Configure

- l. Optionally, click Show SQL, review the commands and then click **Return**.

```
BEGIN
dbms_auto_task_admin.enable(client_name => 'sql tuning advisor',
operation => NULL, window_name => NULL);
END;
```

- m. Click **Apply** to enable Automatic SQL Tuning. You should receive a success message.
- n. Navigate to the Automatic SQL Tuning Settings page. If you are on the Automated Maintenance Tasks Configuration page, click the **Configure** button for Automatic SQL Tuning.
- o. On the Automatic SQL Tuning Settings page, select **No** beside the “Automatic Implementation of SQL Profiles” field, and click **Show SQL**.

```
BEGIN
dbms_sqltune.set_auto_tuning_task_parameter( 'ACCEPT_SQL_PROFILES',
'FALSE');
END;
```

- p. Review the command, click **Return**, and then click **Apply**. You should receive a success message.
10. **OPTIONAL:** Review the `ast_manual_config.sh` script to understand how you can configure Automatic SQL Tuning by using PL/SQL.

Practices for Lesson 20: Using Database Resource Manager

Chapter 20

Practices for Lesson 20: Overview

Lesson Overview

You received complaints that certain batch jobs are using too many system resources and that a specific user is known to start data warehouse processes during regular business hours. You decide to use the Database Resource Manager for better system-resource utilization and control.

Your first effort to balance the situation includes creating an APPUSER consumer group and assigning it to the default DEFAULT_PLAN resource plan. You then map a couple of Oracle users and your major OS user to resource groups. Activate the resource plan and test your assignments. Regularly click Show SQL to review all statements that are new to you.

Practice 20-1: Managing Resources

Overview

In this practice you use Enterprise Manager Cloud Control and SQL*Plus to configure a resource plan with consumer groups to balance the resource usage among different users and applications.

Assumptions

Users SH, OE, and PM are unlocked and the password for each is set to `oracle_4U`.

Task

In this practice, you create an APPUSER consumer group and assign it to the default DEFAULT_PLAN resource plan. Then you map a few Oracle users and your major OS user to resource groups. Activate the resource plan and test your assignments.

Log in as the DBA1 user (with `oracle_4U` password, connect as SYSDBA) and perform the necessary tasks through Enterprise Manager Cloud Control or through SQL*Plus. All scripts for this practice are in the \$LABS/P20 directory.

Whenever you open a new terminal window, execute the `oraenv` script to set environment variables for the `orcl` database.

1. Using Cloud Control, create a resource group called APPUSER. At this point, do not add users to the group.

Step	Window/Page Description	Choices or Values
a.	Cloud Control orcl Database home	Click Administration > Resource Manager
b.	Database Login	Select Credential Preferred . Select Preferred Credential Name: SYSDBA Database Credentials Click Login .
c.	Getting Started with Database Resource Manager	Click Consumer Groups .
d.	Consumer Groups	Click Create .
e.	Create Resource Consumer Group	Enter Consumer Group: APPUSER Verify Scheduling Policy: Round Robin Click Show SQL .
f.	Show SQL	Click Return .
g.	Create Resource Consumer Group	Click OK .

Consumer Groups > Create Resource Consumer Group Logged in As SYS

Create Resource Consumer Group

General Roles

Consumer Groups are user sessions that are grouped together based on resource processing requirements. Each Consumer Group definition specifies the users and roles that are allowed to switch into this Consumer Group.

* Consumer Group APPUSER
 Description
 Scheduling Policy Round Robin

Users permitted to run in this Consumer Group

Select	User	Admin Option
	No items found	Add

Question 1: What does the ROUND-ROBIN parameter value mean?

Possible Answer: ROUND-ROBIN indicates that CPU resources are fairly allocated to the APPUSER consumer group, according to the active resource plan directives.

Show SQL

Execute On Multiple Databases Return

```
BEGIN
dbms_resource_manager.clear_pending_area();
dbms_resource_manager.create_pending_area();
dbms_resource_manager.create_consumer_group(consumer_group =>
'APPUSER',comment => '' , cpu_mth => 'ROUND-ROBIN');
dbms_resource_manager.submit_pending_area();
END;
```

2. Create a new plan called NEW_DEFAULT_PLAN that uses the DEFAULT_PLAN as a template. Use the Create Like action. Add the APPUSER and LOW_GROUP consumer groups to the DEFAULT_PLAN resource plan. Change the level 3 CPU resource allocation percentages: 60 percent for the APPUSER consumer group and 40 percent for the LOW_GROUP consumer group.

Step	Window/Page Description	Choices or Values
a.	Consumer Groups	Click Administration > Resource Manager .
b.	Getting Started with Database Resource Manager	Click Plans .
c.	Resource Plans	Select Default Plan . Select Action Create Like . Click Go .
d.	Create Resource Plan	Enter Plan: NEW_DEFAULT_PLAN
e.	Create Resource Plan	In Resource Allocations section, click Add/Remove .
f.	Select Groups/Subplans	Select APPUSER . Click Move from Available Groups/Subplans.

Step	Window/Page Description	Choices or Values
		pane to Resource Allocations pane. Select LOW_GROUP . Click Move . Click OK .
g.	Create Resource Plan	In Resource Allocations section: For APPUSER, set Shares equal to 40 . For LOW_GROUP, set Shares equal to 20 . For SYS_GROUP, set Shares equal to 30 . Click Show SQL .
h.	Show SQL	Review the PL/SQL code. Click Return .
i.	Create Resource Plan	Click OK .

Resource Plans > Create Resource Plan

Logged in as DBA1

Create Resource Plan

Execute On Multiple Databases Show SQL Cancel OK

General Parallelism Runaway Query Idle Time

A Resource Plan contains directives that specify how resources are allocated to Consumer Groups. For each Consumer Group, a directive specifies the amount of CPU resources are allocated. It also specifies limits, such as the maximum degree of parallelism, execution time, and amount of I/O, that each session in the Consumer Group can consume. You can enable a Resource Plan manually or automatically, using Scheduler Windows. The maximum number of consumer groups in a plan can not exceed 28.

* Plan

Description

Activate this plan
 Automatic Plan Switching Enabled

Resource Allocations

Group/Subplan	Shares	Percentage	Utilization Limit %
APPUSER	40	0	
LOW_GROUP	20	0	
ORA\$AUTOTASK	1	1	90
OTHER_GROUPS	9	9	
SYS_GROUP	30	90	
Total Shares:	100		

3. There are two ways to assign users to consumer groups: The user can be assigned to one or more groups explicitly and an initial group defined, or the user can be mapped into an initial group based on one or more of the rules in the Consumer Group Mappings. Configure Consumer Group Mappings so that the HR Oracle user belongs to the APPUSER consumer group and the SCOTT user to the LOW_GROUP consumer group. For the SCOTT user,

confirm that his ORACLE_USER attribute has a higher priority than the CLIENT_OS_USER attribute.

- a. Log in to SQL*Plus as the DBA1 user.
- b. Execute the `$LABS/P20/assign_hr_appuser.sql` script to assign the HR user to the APPUSER consumer group.

```
SQL> @$LABS/P20/assign_hr_appuser
```

```
PL/SQL procedure successfully completed.
```

```
SQL>
```

- c. Execute the `$LABS/P20/assign_scott_lowgroup.sql` script to assign the SCOTT user to the LOW_GROUP consumer group.

```
SQL> @$LABS/P20/assign_scott_lowgroup
```

```
PL/SQL procedure successfully completed.
```

```
SQL>
```

4. Return to Enterprise Manager Cloud Control to verify the additions you made in step 3.
 - a. Click **Administration > Resource Manager**.
 - b. Click **Consumer Group Mappings**.
 - c. HR and SCOTT now appear in the list.

Consumer Group Mappings

Execute On Multiple Databases | Show SQL | Revert | Apply

General | Priorities

Create rules to enable the resource manager to automatically assign sessions to consumer groups

View All

Add Rule for Selected Type

Select	Priority ▲	View	Value	Consumer Group	Remove
<input checked="" type="radio"/>	1	Service Module and Action	No Mappings Specified		
<input type="radio"/>	2	Service and Module	No Mappings Specified		
<input type="radio"/>	3	Module and Action	No Mappings Specified		
<input type="radio"/>	4	Module	No Mappings Specified		
<input type="radio"/>	5	Service	No Mappings Specified		
<input type="radio"/>	6	Oracle User	HR	APPUSER	
			SCOTT	LOW_GROUP	
			SYS, SYSTEM	SYS_GROUP	
<input type="radio"/>	7	Client Program	No Mappings Specified		
<input type="radio"/>	8	Client OS User	No Mappings Specified		
<input type="radio"/>	9	Client Machine	No Mappings Specified		
<input type="radio"/>	10	Client ID	No Mappings Specified		

5. Assign the PM Oracle user to the following consumer groups: APPUSER, LOW_GROUP, and SYS_GROUP without using the Consumer Group Mappings.

Step	Window/Page Description	Choices or Values
a.	Consumer Group Mappings	Click Security > Users .
b.	Users	Enter PM in the Search box. Click Go .
c.	Users	Select PM user. Click Edit .
d.	Edit User: PM	Click Consumer Group Privileges tab. If you see an error regarding the password for the PM user, enter oracle_4U in both the password fields.
e.	Edit User: PM : Consumer Group Privileges tab	Click Edit List .
f.	Modify Consumer Groups	Move APPUSER to Selected Consumer Groups. Move LOW_GROUP to Selected Consumer Groups.

Step	Window/Page Description	Choices or Values
		Move SYS_GROUP to Selected Consumer Groups. Click OK .
g.	Edit User: PM	Set Default Consumer Group to APPUSER . Click Show SQL .
h.	Show SQL	Note: The PM user is granted the privilege of switching to any of the three groups, but the initial group is set to APPUSER. Click Return .
i.	Edit User: PM	Click Apply .

Users > Edit User: PM
Edit User: PM

Actions | Create Like | Go | Execute On Multiple Databases | Show SQL | Revert | Apply

General Roles System Privileges Object Privileges Quotas Consumer Group Privileges Proxy Users

Resource consumer groups are groups of users, or sessions, that are grouped together based on their processing needs. If a user is granted permission to switch to a particular consumer group, then that user can switch their current consumer group to the new consumer group.

Consumer Group	Admin Option	Edit List
APPUSER	<input type="checkbox"/>	<input type="checkbox"/>
LOW_GROUP	<input type="checkbox"/>	<input type="checkbox"/>
SYS_GROUP	<input type="checkbox"/>	<input type="checkbox"/>
Default Consumer Group	APPUSER	

6. Activate the **NEW_DEFAULT_PLAN** resource plan.

Step	Window/Page Description	Choices or Values
a.	Edit User: PM	Click Administration > Resource Manager
b.	Getting Started with Database Resource Manager	Click Plans .
c.	Resource Plans	Select NEW_DEFAULT_PLAN . Select Activate in the Actions menu. Click GO .
d.	Confirmation	Click Yes .
e.	Resource Plans	You should see a success message. NEW_DEFAULT_PLAN has status of ACTIVE .

7. Test the consumer group mappings. Start two SQL*Plus sessions: the first with the system/oracle_4U@orcl connect string and the second with the scott/tiger@orcl connect string.

- a. As the `oracle` user in a terminal window, execute the `oraenv` script to set environment variables for the `orcl` database.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
$
```

Your output may be different depending on your previously executed tasks.

- b. To start a SQL*Plus session with the `system/oracle_4U@orcl` connect string and to set your SQL prompt to "FIRST," enter:

```
$ sqlplus system@orcl
Enter password: oracle_4U <<< not displayed

SQL> SET SQLPROMPT "FIRST>"
```

```
FIRST>
```

- c. As the `oracle` user in a second terminal window, execute the `oraenv` script to set environment variables for the `orcl` database.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl
$
```

Your output may be different depending on your previously executed tasks.

- d. To start a SQL*Plus session with the `scott/tiger@orcl` connect string and to set your SQL prompt to "SECOND," enter:

```
$ sqlplus scott@orcl
Enter password: tiger <<< not displayed

SQL> SET SQLPROMPT "SECOND>"
```

```
SECOND>
```

- e. In your FIRST SQL*Plus session, enter:

```
column username format A12
column resource_consumer_group format A24
SELECT username, resource_consumer_group, count(username)
  FROM v$session
 WHERE username IS not null
   AND program IS not null
 GROUP BY username, resource_consumer_group;
```

Note: This statement is available in the `/solns/sol_qry_vsSession.sql` file.

```
FIRST> column username format A12
FIRST> column resource_consumer_group format A24

FIRST> SELECT username, resource_consumer_group, count(username)
  2  FROM v$session
  3  WHERE username IS not null
```

```

4 AND PROGRAM IS not null
5 GROUP By username, resource_consumer_group;

USERNAME      RESOURCE_CONSUMER_GROUP COUNT(USERNAME)
-----
DBSNMP        OTHER_GROUPS            2
SYS           SYS_GROUP              1
SCOTT          LOW_GROUP              1
SYSTEM         SYS_GROUP              1

```

Question: To which consumer group does the SCOTT user belong?

Answer: SCOTT is in the LOW_GROUP consumer group.

Note: Your output for this step (and the following steps) may not look exactly like the output shown. The information of concern here is for the specific users being mentioned.

- f. In the SECOND terminal window, connect as the PM user with the oracle_4U password:

```

SECOND> connect pm@orcl
Enter password: oracle_4U <<< not displayed

Connected.
SECOND>

```

- g. In your FIRST SQL*Plus session, enter "/" to execute the previous SQL statement again.

```

FIRST>/

USERNAME      RESOURCE_CONSUMER_GROUP COUNT(USERNAME)
-----
DBSNMP        OTHER_GROUPS            2
SYS           SYS_GROUP              1
PM             APPUSER                1
SYSTEM         SYS_GROUP              1

FIRST>

```

Question: To which consumer group does the PM user belong?
Answer: PM is in the APPUSER consumer group.

- h. In the SECOND terminal window, connect as the OE user with the oracle_4U password:

```

SECOND> connect oe@orcl
Enter password: oracle_4U <<< not displayed

Connected.
SECOND>

```

- In your FIRST SQL*Plus session, enter “/” to execute the previous SQL statement again.

```
FIRST>/
```

USERNAME	RESOURCE_CONSUMER_GROUP	COUNT (USERNAME)
DBSNMP	OTHER_GROUPS	2
OE	OTHER_GROUPS	1
SYS	SYS_GROUP	1
SYSTEM	SYS_GROUP	1

```
FIRST> exit
```

- Exit both the SQL*Plus sessions.

Question: When testing your OE Oracle user, you notice that OE is in the OTHER_GROUPS consumer group. Why is that?

Possible Answer: The OE user is not explicitly assigned to another consumer resource group.

- Revert to your original configuration by deactivating the NEW_DEFAULT_PLAN resource group, undoing all consumer group mappings, and finally by deleting the APPUSER resource group.

Step	Window/Page Description	Choices or Values
a.		Click Administration > Resource Manager
b.	Getting Started with Database Resource Manager	Click Plans .
c.	Resource Plans	Select INTERNAL_PLAN . Select Activate in the Actions menu. Click GO .
d.	Confirmation	Click Yes .
e.	Resource Plans	You should see a success message INTERNAL_PLAN has status of ACTIVE

- To reconfigure or undo all consumer group mappings, review and execute the rsc_cleanup.sh script from the \$LABS/P20 directory:

```
$ cd $LABS/P20
$ cat rsc_cleanup.sh
#!/bin/bash
# Oracle Database 12c: Administration Workshop
# Oracle Server Technologies - Curriculum Development
#
# ***Training purposes only***
# ***Not appropriate for production use***
```

```

#
# This script supports the Resource Manager practice session.
# Start this script connected as OS user: oracle.

sqlplus -S "/" as sysdba" << EOF

PROMPT remove PM from consumer groups

BEGIN
    dbms_resource_manager_privs.revoke_switch_consumer_group(
        revokee_name => 'PM',
        consumer_group => 'APPUSER'
    );
END;
/
BEGIN
    dbms_resource_manager_privs.revoke_switch_consumer_group(
        revokee_name => 'PM',
        consumer_group => 'LOW_GROUP'
    );
END;
/
BEGIN
    dbms_resource_manager_privs.revoke_switch_consumer_group(
        revokee_name => 'PM',
        consumer_group => 'SYS_GROUP'
    );
END;
/
PROMPT remove hr, scott from oracle_user

BEGIN
dbms_resource_manager.clear_pending_area();
dbms_resource_manager.create_pending_area();
dbms_resource_manager.set_consumer_group_mapping(
    dbms_resource_manager.oracle_user,
    'HR',
    NULL
);
dbms_resource_manager.set_consumer_group_mapping(

```

```
dbms_resource_manager.oracle_user,
'SCOTT',
NULL
);
dbms_resource_manager.submit_pending_area();
END;
/
PROMPT remove NEW_DEFAULT_PLAN

BEGIN
dbms_resource_manager.clear_pending_area();
dbms_resource_manager.create_pending_area();
dbms_resource_manager.delete_plan('NEW_DEFAULT_PLAN');
dbms_resource_manager.submit_pending_area();
END;
/

Prompt Remove the APPUSER and LOW_GROUP consumer groups

BEGIN
dbms_resource_manager.clear_pending_area();
dbms_resource_manager.create_pending_area();
dbms_resource_manager.delete_consumer_group('APPUSER');
dbms_resource_manager.delete_consumer_group('LOW_GROUP');
dbms_resource_manager.submit_pending_area();

END;

exit
EOF
```

```
$ ./rsc_cleanup.sh

remove PM from consumer groups
PL/SQL procedure successfully completed.
PL/SQL procedure successfully completed.
PL/SQL procedure successfully completed.

remove hr, scott from oracle_user
PL/SQL procedure successfully completed.
```

```
remove NEW_DEFAULT_PLAN  
PL/SQL procedure successfully completed.  
  
Remove the APPUSER and LOW_GROUP consumer groups  
PL/SQL procedure successfully completed.  
  
$
```

- g. Log out of Enterprise Manager Cloud Control.

Practices for Lesson 21: Using Oracle Scheduler to Automate Tasks

Chapter 21

Practices for Lesson 21: Overview

Practice Overview

In these practices, you explore Oracle Scheduler capabilities.

Practice 21-1: Creating Scheduler Components

Overview

In this practice, you create Scheduler components such as programs, jobs, and schedules.

Task

In this practice, you use Enterprise Manager Cloud Control to create Scheduler objects in the ORCL database instance and automate tasks.

1. Create a simple job that runs a SQL script by using Enterprise Manager Cloud Control.
 - a. Log in to Enterprise Manager Cloud Control and navigate to the `orcl` database home page.
 - b. Expand **Administration**. Select **Oracle Scheduler > Jobs**.

The screenshot shows the Oracle Enterprise Manager Cloud Control interface. The left sidebar has a 'Administration' dropdown menu. Under 'Administration', the 'Oracle Scheduler' option is selected and highlighted with a yellow background. Below 'Oracle Scheduler', there is a list of sub-options: Home, Jobs, Job Classes, Chains, Schedules, Programs, Windows, Window Groups, Global Attributes, and Automated Maintenance Tasks. The 'Jobs' option is also highlighted with a yellow background. At the bottom of the sidebar, there are three time stamps: 22 AM, 11:32 AM, and 11:42 AM. The top right corner of the interface shows a refresh icon and the text 'Page Refreshed Oct 21, 2014'.

- c. Log in with your Named credential or enter `DBA1` in the Username field and `oracle_4u` in the Password field. Click **Login**.
- d. On the Scheduler Jobs page, click **Create** and fill in the fields as follows. Accept default values if no value is provided in the instructions.
 - **General tab:**

Name:	<code>CREATE_LOG_TABLE_JOB</code>
Schema:	<code>HR</code>
Enabled:	Yes
Description:	Create the SESSION_HISTORY table
Logging Level:	Log job runs only (RUNS)
Auto Drop:	False
Command Type:	PL/SQL Block

```
PL/SQL Block:  
begin  
    execute immediate  
    ('create table session_history(  
        snap_time TIMESTAMP WITH LOCAL TIME ZONE,  
        num_sessions NUMBER)');  
end;
```

Scheduler Jobs > Create Job
Create Job

General Schedule Options Execute On Multiple Databases | Show

* Name 🔍

* Schema 🔍

Enabled Yes No

Description

Logging Level Specify logging requirements for the job

Job Class 🔍 Create Job Class

Auto Drop Specify whether the job should be dropped after completion

Restartable Specify whether the job can be restarted manually or in the event of failure

Destination Credential Name []
Destination and Credential Name only apply for jobs of type executable. For Destination specify the host:port of the machine on which the external job will run if the job is running. Credential Name specify the credential to use to run the external job.

Command

Select the command type for the job, then enter the command requirements.

Command Type Change Command Type

PL/SQL

- **Schedule tab:**

Timezone: Accept the default.

Repeating: **Do not Repeat**

Start: **Immediately**

Scheduler Jobs > Create Job

Create Job

General Schedule Options

Schedule Type Standard

Time Zone (UTC+00:00) Universal Time

Repeating

Repeat Do Not Repeat

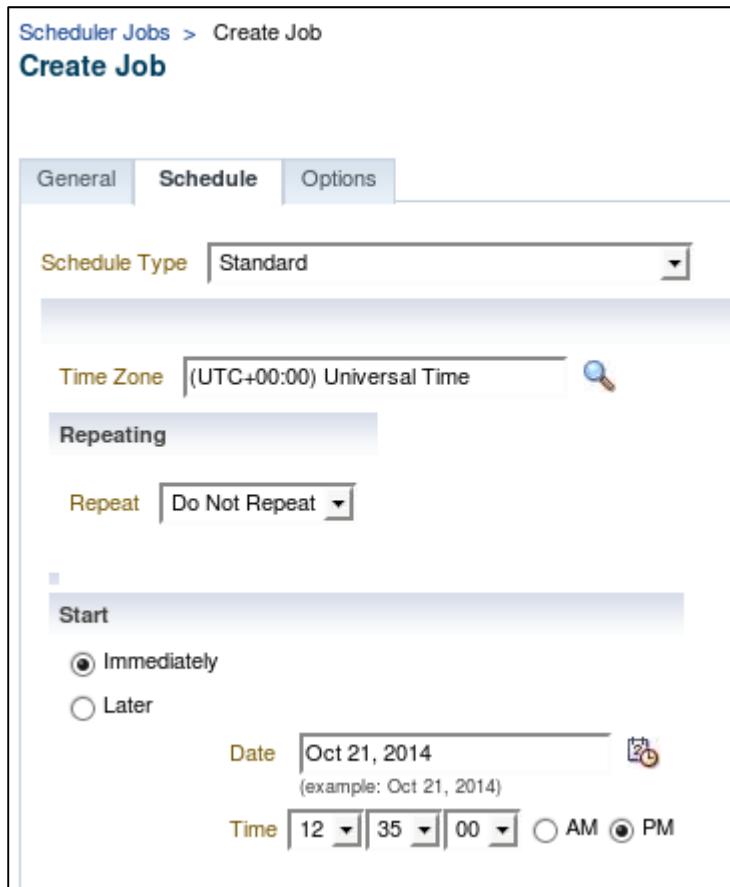
Start

Immediately

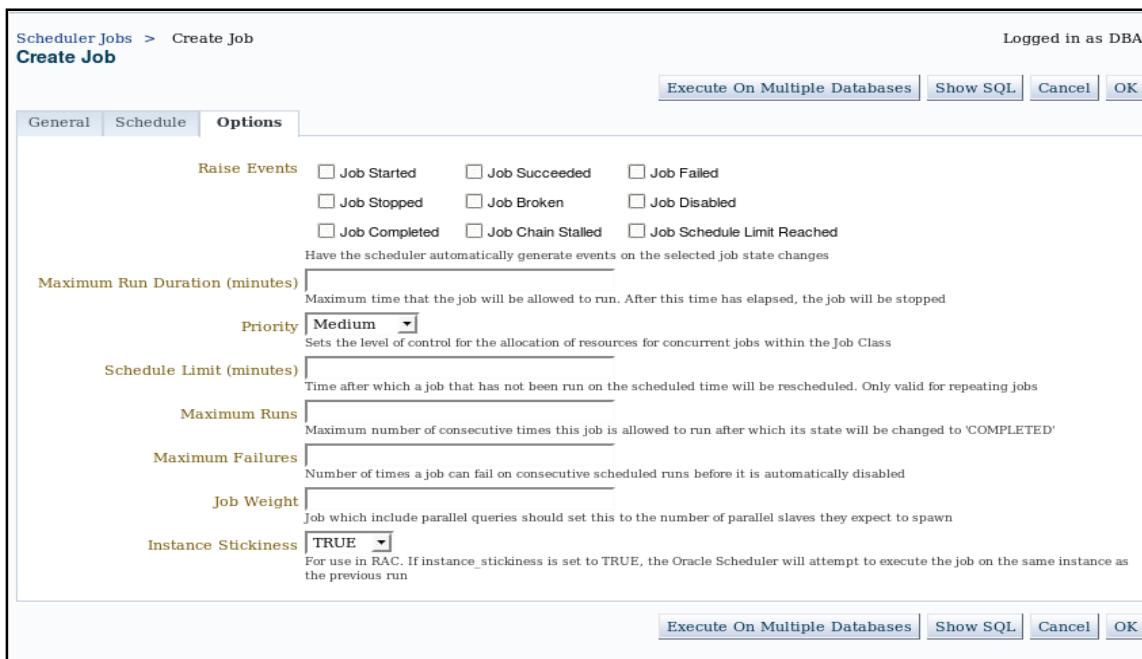
Later

Date Oct 21, 2014
(example: Oct 21, 2014)

Time 12 35 00 AM PM



- **Options tab:**
Accept the defaults.



- Click **Show SQL** if you want to view the SQL statement defining your job. Review the statements and click **Return**.

Scheduler Jobs > Create Job

Show SQL

```

BEGIN
  sys.dbms_scheduler.create_job(
    job_name => '"HR"."CREATE_LOG_TABLE_JOB"',
    job_type => 'PLSQL_BLOCK',
    job_action => 'begin
      execute immediate
        (''create table session_history(
          snap_time TIMESTAMP WITH LOCAL TIME ZONE,
          num_sessions NUMBER)'');
    end;',
    start_date => systimestamp at time zone 'UTC',
    job_class => '"DEFAULT_JOB_CLASS"',
    comments => 'Create the SESSION_HISTORY table',
    auto_drop => FALSE,
    enabled => TRUE);
END;

```

- Click **OK** to create the job.

2. Log in to SQL*Plus as the DBA1 user. Grant the CONNECT, RESOURCE, and DBA roles to the HR user.

```
$ . oraenv
ORACLE_SID = [orcl] ? orcl

$ sqlplus dba1/oracle_4U as sysdba
Connected.
SQL> GRANT connect, resource, dba TO hr;

Grant succeeded.

SQL> EXIT
$
```

3. Return to Enterprise Manager Cloud Control. On the Scheduler Jobs page, re-order the jobs by **Last Run Date** by clicking the column name until they are in descending order. If the job does not appear on the Scheduler Jobs page, click the Refresh button until it succeeds. Also, you may not see it “running,” but with the Last Run Status of SUCCEEDED. If you do not see the job on the All page, check the History page.
- Click the link in the Name column.
 - Click the Log ID to view details of the job execution.

Scheduler Jobs > View Job: HR.CREATE_LOG_TABLE_JOB > Operation Detail:33622
Operation Detail:33622

General					
Name	CREATE_LOG_TABLE_JOB	Schema	HR	Operation	RUN
Log ID	33622	User Name		Status	SUCCEEDED
Log Date	Oct 21, 2014 12:29:42 PM +00:00				

Run Detail					
Request Start Date	Oct 21, 2014 12:29:40 PM +00:00	Run Duration (minutes)	0.0	Instance ID	1
Actual Start Date	Oct 21, 2014 12:29:42 PM +00:00	CPU Used (seconds)	0.05	Session ID	41,55953
Error #	0			Process ID	31774

Details
Output

4. Create a program called LOG_SESS_COUNT_PRGM that logs the current number of database sessions into a table. Use the following code:

```
DECLARE
  sess_count    NUMBER;
BEGIN
  SELECT COUNT(*) INTO sess_count FROM V$SESSION;
  INSERT INTO session_history VALUES (systimestamp, sess_count);
  COMMIT;
END;
```

- Navigate to **Administration > Oracle Scheduler > Programs**.
- On the Scheduler Programs page, click the **Create** button.

- c. On the Create Program page, enter and confirm the following values:

Name: **LOG_SESS_COUNT_PRGM**

Schema: **HR**

Enabled: **Yes**

Type: **PL/SQL BLOCK**

Source:

```
DECLARE
    sess_count    NUMBER;
BEGIN
    SELECT COUNT(*) INTO sess_count FROM V$SESSION;
    INSERT INTO session_history VALUES (systimestamp,
    sess_count);
    COMMIT;
END;
```



- d. Click **Show SQL**.

```
BEGIN
DBMS_SCHEDULER.CREATE_PROGRAM(
program_name=>'HR"."LOG_SESS_COUNT_PRGM"',
program_action=>'DECLARE
sess_count    NUMBER;
BEGIN
SELECT COUNT(*) INTO sess_count FROM V$SESSION;
INSERT INTO session_history VALUES (systimestamp, sess_count);
COMMIT;
END;
',
program_type=>'PLSQL_BLOCK',
number_of_arguments=>0,
comments=>',
enabled=>TRUE)';
END;
```

- e. Review the statements, and then click **Return**.
- f. Click **OK** to create the program. You should see the program on the Scheduler Programs page.

Scheduler Programs

Following are the programs that define what are to be executed in the jobs.

View	Edit	Delete	Create Like	Go	Select	Name	Schema	Enabled	Type	Description
<input checked="" type="radio"/>	AQ\$_PROPAGATION_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	AQ propagation program					
<input type="radio"/>	AUTO_SPACE_ADVISOR_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	auto space advisor maintenance program					
<input type="radio"/>	AUTO_SQL_TUNING_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Program to run automatic sql tuning and SPM evolve tasks, see d					
<input type="radio"/>	BSLN_MAINTAIN_STATS_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Moving window baseline statistics maintenance program					
<input type="radio"/>	FILE_WATCHER_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	File Watcher program					
<input type="radio"/>	GATHER_STATS_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	Oracle defined automatic optimizer statistics collection program					
<input type="radio"/>	HS_PARALLEL_SAMPLING	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE						
<input type="radio"/>	LOG_SESS_COUNT_PRGM	HR	<input checked="" type="checkbox"/>	PLSQL_BLOCK						
<input type="radio"/>	ORA\$AGE_AUTOTASK_DATA	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	deletes obsolete AUTOTASK repository data					
<input type="radio"/>	PMO_DEFERRED_GIDX_Maint	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Oracle defined automatic index cleanup for partition maintenance					
<input type="radio"/>	PURGE_LOG_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	purge log program					

5. Create a schedule named SESS_UPDATE_SCHED owned by HR that executes every three seconds. Use SQL*Plus and the DBMS_SCHEDULER.CREATE_SCHEDULE procedure to create the schedule.

```
BEGIN
  DBMS_SCHEDULER.CREATE_SCHEDULE (
    schedule_name => 'SESS_UPDATE_SCHED',
    start_date => SYSTIMESTAMP,
    repeat_interval => 'FREQ=SECONDLY; INTERVAL=3',
    comments => 'Every three seconds');
END;
/
```

Return to Enterprise Manager Cloud Control and verify that the SESS_UPDATE_SCHED schedule was created.

Hint: You may have to refresh the page for the Schedule to appear.

- a. In a terminal window, enter:

```
$ sqlplus hr
Enter password: oracle_4U <<< not displayed
SQL>
```

- b. In your SQL*Plus session, enter:

```
SQL> BEGIN
      DBMS_SCHEDULER.CREATE_SCHEDULE (
        schedule_name => 'SESS_UPDATE_SCHED',
        start_date => SYSTIMESTAMP,
        repeat_interval => 'FREQ=SECONDLY; INTERVAL=3',
```

```

    comments => 'Every three seconds');

END;

/
2      3      4      5      6      7      8
PL/SQL procedure successfully completed.

SQL>

```

- In Enterprise Manager Cloud Control, navigate to **Administration > Oracle Scheduler > Schedules**.
- Verify that the `SESS_UPDATE_SCHED` schedule has been created. (You may have to refresh the page for the Schedule to appear.)

The screenshot shows the 'Scheduler Schedules' page in Oracle Database Cloud Control. At the top right, it says 'Logged in as DBA'. Below that, there are buttons for 'Edit', 'View', 'Delete', and 'Create Like'. A message at the top right indicates 'Page Refreshed Oct 21, 2014 1:02:32 PM UTC' with 'Refresh' and 'Create' buttons. The main area is a table with columns: Select, Name, Schema, Start Date, End Date, and Description. The table contains the following data:

Select	Name	Schema	Start Date	End Date	Description
<input checked="" type="radio"/>	DAILY_PURGE_SCHEDULE	SYS			Pre-defined schedule for computing moving window baseline statistics
<input type="radio"/>	FILE_WATCHER_SCHEDULE	SYS			
<input type="radio"/>	PMO_DEFERRED_GIDX_MAINT_SCHED	SYS			
<input type="radio"/>	BSLN_MAINTAIN_STATS_SCHED	SYS	Jul 13, 2014 12:00:00 AM -07:00		
<input type="radio"/>	SESS_UPDATE_SCHED	HR	Oct 21, 2014 1:02:08 PM +00:00		Every three seconds

- Using Enterprise Manager Cloud Control, create a job named `LOG_SESSIONS_JOB` that uses the `LOG_SESS_COUNT_PRGM` program and the `SESS_UPDATE_SCHED` schedule. Make sure that the job uses `FULL` logging.
- In Enterprise Manager, navigate to **Administration > Oracle Scheduler > Jobs**, and then click the **Create** button.
- On the Create Job page, enter and confirm the following values:

Name: `LOG_SESSIONS_JOB`

Owner: `HR`

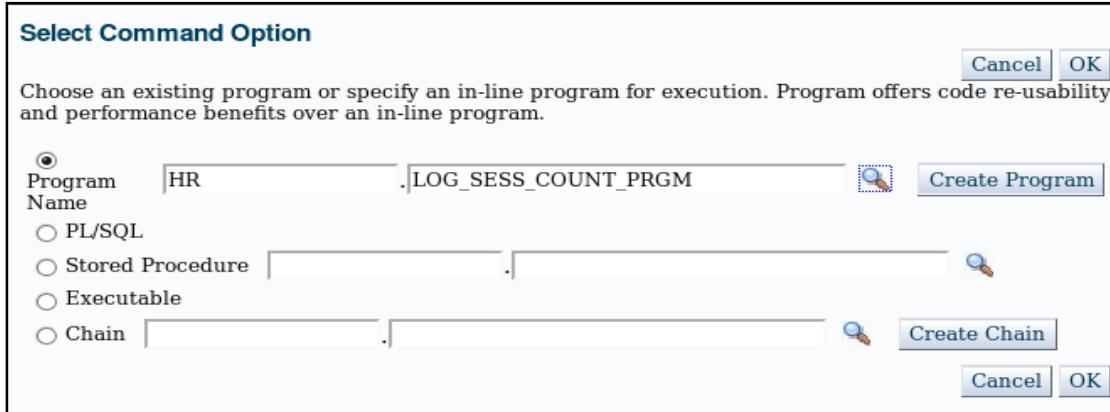
Enabled: Yes

Description: Count sessions with `HR.LOG_SESS_COUNT_PRGM`

Logging level: Log everything (`FULL`)

Auto Drop: FALSE

- c. Click **Change Command Type**, and on the Select Command Option page, select **Program Name** and enter `HR.LOG_SESS_COUNT_PRGM` in the field next to it, or use the Lookup icon to select the program. Click **OK**.



- d. Back on the Create Job page, click the **Schedule** tab.

General

- * Name: LOG_SESSIONS_JOB
- * Schema: HR
- Enabled: Yes
- Description: Count sessions with HR.LOG_SESS_COUNT_PRGM
- Logging Level: Log everything (FULL)
- Job Class: DEFAULT_JOB_CLASS
- Auto Drop: FALSE
- Restartable: FALSE
- Destination: (empty)
- Credential Name: (empty)

Command

Select the command type for the job, then enter the command requirements.

Command Type: Program Change Command Type

Program Name: HR.LOG_SESS_COUNT_PRGM

- e. Change the Schedule Type to “**Use Pre-Defined Schedule**” and select the **HR.SESSIONS_UPDATE_SCHED** schedule by using the Lookup icon. Click **Show SQL**.

- f. Review the statements, and then click **Return**.

```

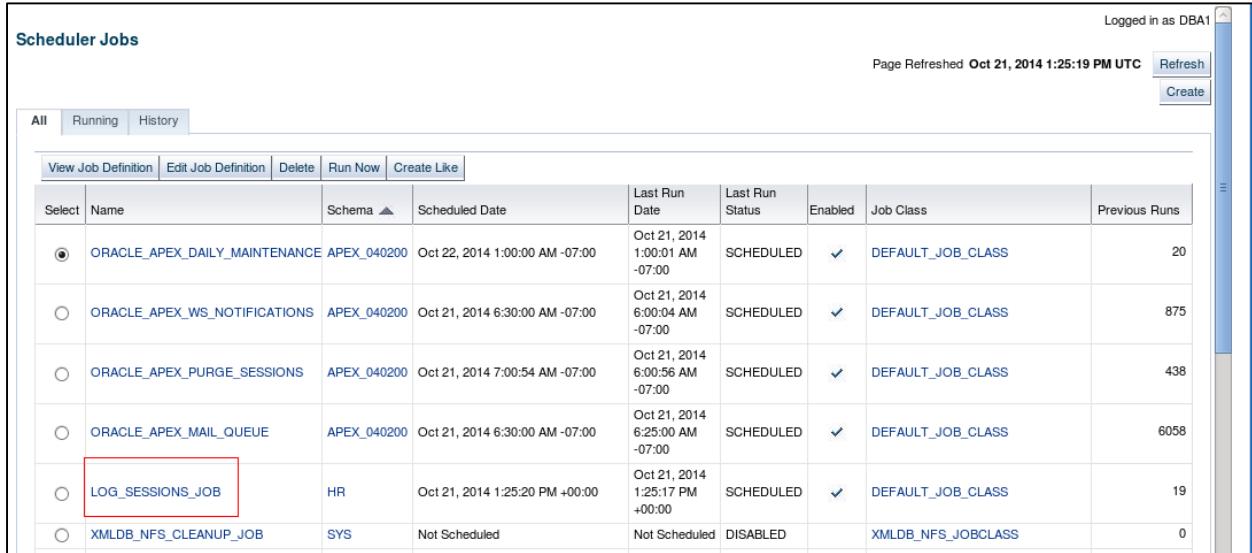
Scheduler Jobs > Create Job
Show SQL
Logged in as hr

BEGIN
  sys.dbms_scheduler.create_job(
    job_name => '"HR"."LOG_SESSIONS_JOB"',
    program_name => '"HR"."LOG_SESS_COUNT_PRGM"',
    schedule_name => '"HR"."SESS_UPDATE_SCHED"',
    job_class => '"DEFAULT_JOB_CLASS"',
    comments => 'Count sessions with HR.LOG_SESS_COUNT_PRGM',
    auto_drop => FALSE,
    enabled => FALSE);
  sys.dbms_scheduler.set_attribute( name => '"HR"."LOG_SESSIONS_JOB"', attribute =>
    'logging_level', value => DBMS_SCHEDULER.LOGGING_FULL);
  sys.dbms_scheduler.enable( '"HR"."LOG_SESSIONS_JOB"');
END;

```

- g. On the Create Job page, click **OK** to create the job.

- h. You should receive a success message and see the job on the Scheduler Jobs page.



The screenshot shows the Oracle Database Scheduler Jobs page. At the top right, it says "Logged in as DBA1" and "Page Refreshed Oct 21, 2014 1:25:19 PM UTC". There are "Refresh" and "Create" buttons. Below the header, there are tabs for "All", "Running", and "History", with "All" selected. A toolbar below the tabs includes "View Job Definition", "Edit Job Definition", "Delete", "Run Now", and "Create Like". The main table lists the following jobs:

Select	Name	Schema	Scheduled Date	Last Run Date	Last Run Status	Enabled	Job Class	Previous Runs
<input checked="" type="radio"/>	ORACLE_APEX_DAILY_MAINTENANCE_APEX_040200	APEX_040200	Oct 22, 2014 1:00:00 AM -07:00	Oct 21, 2014 1:00:01 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	20
<input type="radio"/>	ORACLE_APEX_WS_NOTIFICATIONS_APEX_040200	APEX_040200	Oct 21, 2014 6:30:00 AM -07:00	Oct 21, 2014 6:00:04 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	875
<input type="radio"/>	ORACLE_APEX_PURGE_SESSIONS_APEX_040200	APEX_040200	Oct 21, 2014 7:00:54 AM -07:00	Oct 21, 2014 6:00:56 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	438
<input type="radio"/>	ORACLE_APEX_MAIL_QUEUE_APEX_040200	APEX_040200	Oct 21, 2014 6:30:00 AM -07:00	Oct 21, 2014 6:25:00 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	6058
<input type="radio"/>	LOG_SESSIONS_JOB	HR	Oct 21, 2014 1:25:20 PM +00:00	Oct 21, 2014 1:25:17 PM +00:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	19
<input type="radio"/>	XMLDB_NFS_CLEANUP_JOB	SYS	Not Scheduled	Not Scheduled	DISABLED		XMLDB_NFS_JOBCLASS	0

Note that it quickly accumulates previous runs, because it executes every three seconds.

7. In your SQL*Plus session, check the HR.SESSION_HISTORY table for rows.

Enter:

```
SQL> SELECT * FROM SESSION_HISTORY ORDER BY snap_time;
```

```
SNAP_TIME
```

```
-----
```

```
NUM_SESSIONS
```

```
-----
```

```
...
```

```
21-OCT-14 01.27.04.790310 PM
```

```
58
```

```
21-OCT-14 01.27.08.887697 PM
```

```
58
```

```
21-OCT-14 01.27.12.986016 PM
```

```
58
```

```
SNAP_TIME
```

```
-----
```

```
NUM_SESSIONS
```

```
-----
```

```
21-OCT-14 01.27.17.093735 PM
```

```
58
```

```
52 rows selected.  
SQL>
```

Your result looks different but the second values should be three seconds apart.

Question: If there are rows in the table, are the time stamps three seconds apart?

Answer: Yes, there are rows. Yes, the time stamps are more or less three seconds apart.

8. Use Enterprise Manager Cloud Control to alter the SESS_UPDATE_SCHED schedule from every three seconds to every three minutes. Then use SQL*Plus to verify that the rows are now being added every three minutes by querying the HR.SESSION_HISTORY table, ordered by the SNAP_TIME column.
 - a. In Enterprise Manager, navigate to **Administration > Oracle Scheduler > Schedules**.
 - b. Click the SESS_UPDATE_SCHED link.
 - c. On the View Schedule page, click **Edit**.
 - d. Change the description to “Every three minutes.”
 - e. Click **Schedule Attributes** tab to change the value in the **Repeat** drop-down list from **By Seconds** to **By Minutes**.
 - f. Change **Available to Start** to **Immediately**.

Scheduler Schedules > Edit Schedule: HR.SESSION_HISTORY

Edit Schedule: HR.SESSION_HISTORY

General **Schedule Attributes**

Repeating

Repeat: By Minutes

Interval (Minutes): 3

Days of Week: Monday Tuesday Wednesday Thursday Friday Saturday Sunday

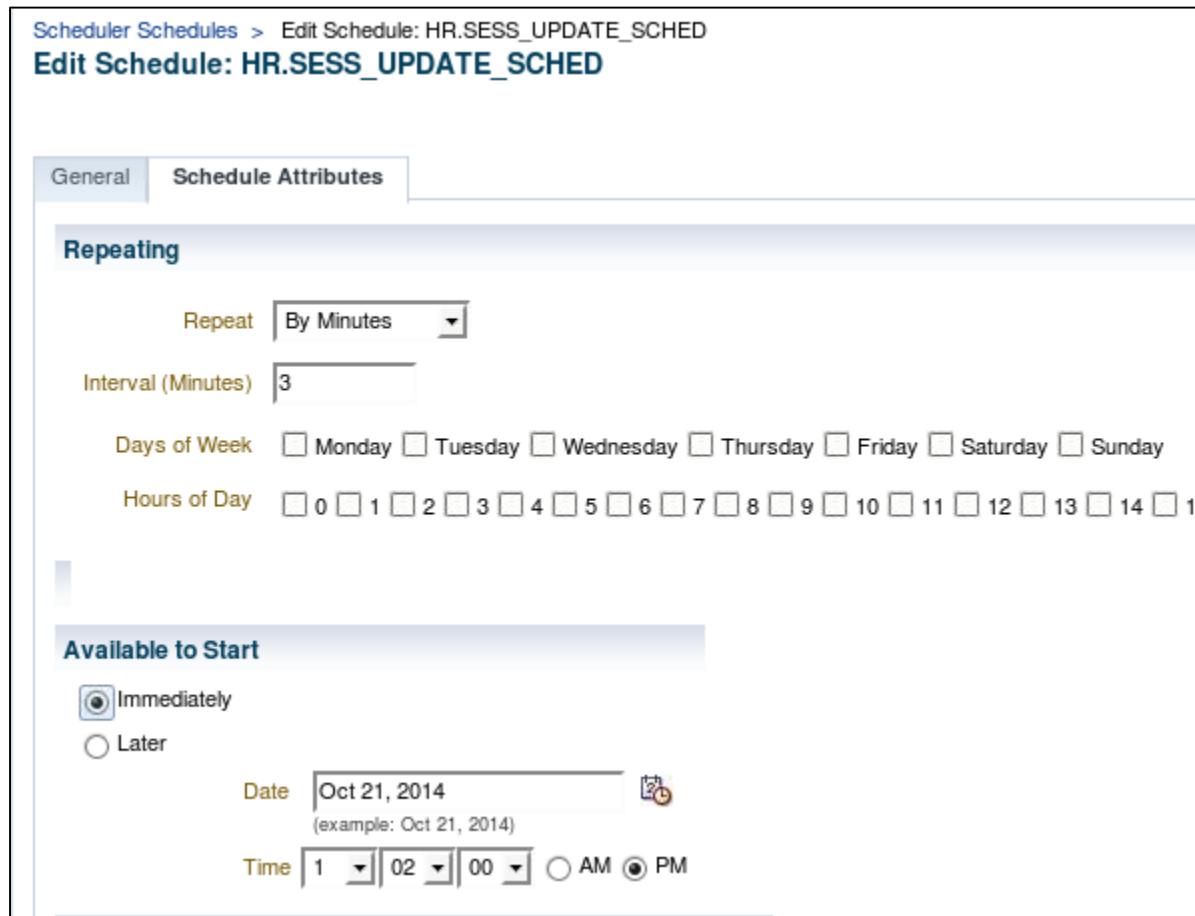
Hours of Day: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Available to Start

Immediately Later

Date: Oct 21, 2014 (example: Oct 21, 2014) 

Time: 10:00 AM PM



- g. Ensure that the interval is 3 minutes, and then click **Show SQL**.

Scheduler Schedules > Edit Schedule: HR.SESSION_HISTORY_SCHED Logged in As DBA1
Show SQL [Execute On Multiple Databases](#) [Return](#)

```
BEGIN
  sys.dbms_scheduler.set_attribute( name =>
    'HR"."SESSION_HISTORY_SCHED"', attribute => 'repeat_interval', value
    => 'FREQ=MINUTELY;INTERVAL=3');
  sys.dbms_scheduler.set_attribute( name =>
    'HR"."SESSION_HISTORY_SCHED"', attribute => 'start_date', value =>
    systimestamp at time zone '0:00');
  sys.dbms_scheduler.set_attribute( name =>
    'HR"."SESSION_HISTORY_SCHED"', attribute => 'comments', value =>
    'Every three minutes');
END;
```

- h. Review the statements, click **Return**, and then click **Apply**.

You should receive a success message.

9. In your SQL*Plus session, query the **HR.SESSION_HISTORY** table, ordered by the **SNAP_TIME** column. (Wait for three minutes after you update the schedule.) Enter:

SQL> **SELECT * FROM HR.SESSION_HISTORY ORDER BY snap_time;**

SNAP_TIME

NUM_SESSIONS

...

21-OCT-14 01.32.43.076946 PM

58

21-OCT-14 01.32.47.180994 PM

58

21-OCT-14 01.35.50.726790 PM

57

SNAP_TIME

NUM_SESSIONS

21-OCT-14 01.38.50.751317 PM

57

142 rows selected.

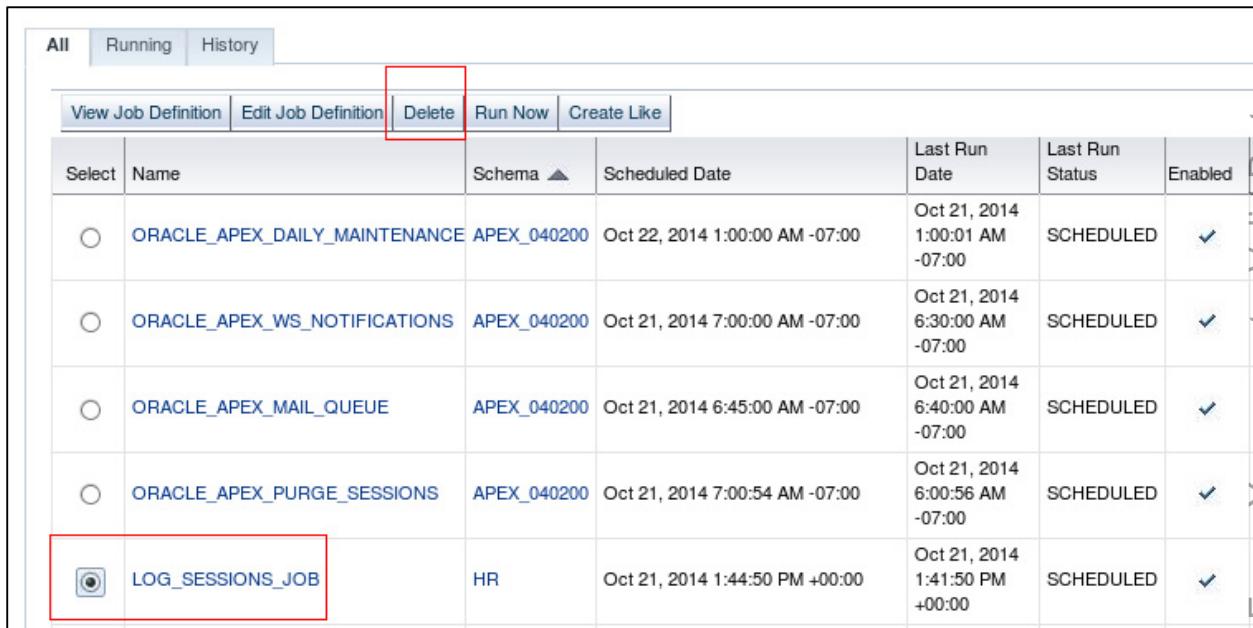
SQL>

Your results will have different dates (but the minute values should now be three minutes apart).

10. **This is your mandatory cleanup task.** Use Enterprise Manager Cloud Control to drop the LOG_SESSIONS_JOB and CREATE_LOG_TABLE_JOB jobs, the LOG_SESS_COUNT_PRGM program, and the SESS_UPDATE_SCHED schedule. Use SQL*Plus to drop the SESSION_HISTORY table, and exit from your session.

Note: Make sure that you do not delete the wrong schedule.

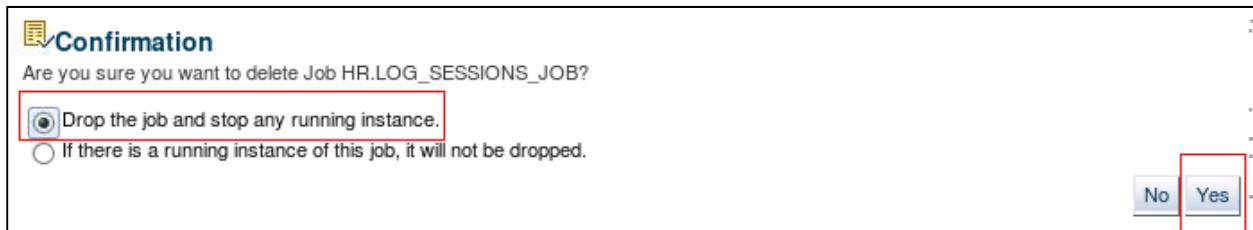
- a. Navigate to **Administration > Oracle Scheduler > Jobs**.
- b. Select the **LOG_SESSIONS_JOB** job and click **Delete**.



The screenshot shows the Oracle Scheduler Jobs page. At the top, there are tabs: All, Running, and History. Below the tabs is a toolbar with buttons: View Job Definition, Edit Job Definition, Delete (which is highlighted with a red box), Run Now, and Create Like. The main area is a table listing jobs. The columns are: Select, Name, Schema, Scheduled Date, Last Run Date, Last Run Status, and Enabled. There are five rows of data. The fifth row, which contains the 'LOG_SESSIONS_JOB' name, has its entire row highlighted with a red box. The 'Delete' button in the toolbar is also highlighted with a red box.

Select	Name	Schema	Scheduled Date	Last Run Date	Last Run Status	Enabled
<input type="radio"/>	ORACLE_APEX_DAILY_MAINTENANCE_APEX_040200	APEX_040200	Oct 22, 2014 1:00:00 AM -07:00	Oct 21, 2014 1:00:01 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>
<input type="radio"/>	ORACLE_APEX_WS_NOTIFICATIONS	APEX_040200	Oct 21, 2014 7:00:00 AM -07:00	Oct 21, 2014 6:30:00 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>
<input type="radio"/>	ORACLE_APEX_MAIL_QUEUE	APEX_040200	Oct 21, 2014 6:45:00 AM -07:00	Oct 21, 2014 6:40:00 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>
<input type="radio"/>	ORACLE_APEX_PURGE_SESSIONS	APEX_040200	Oct 21, 2014 7:00:54 AM -07:00	Oct 21, 2014 6:00:56 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>
<input checked="" type="radio"/>	LOG_SESSIONS_JOB	HR	Oct 21, 2014 1:44:50 PM +00:00	Oct 21, 2014 1:41:50 PM +00:00	SCHEDULED	<input checked="" type="checkbox"/>

- c. Select “Drop the job and stop any running instance,” and then click **Yes**.



- d. Go back to the Scheduler Jobs page, select CREATE_LOG_TABLE_JOB, and click **Delete**. Select “Drop the job and stop any running instance,” and then click **Yes**.
- e. Navigate to **Administration > Oracle Scheduler > Programs**.

- f. Select the **LOG_SESS_COUNT_PRGM** program and click **Delete**.

Scheduler Programs					
Following are the programs that define what are to be executed in the jobs.					
Select	Name	Schema	Enabled	Type	Description
<input type="radio"/>	AQ\$_PROPAGATION_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	AQ propagation program
<input type="radio"/>	AUTO_SPACE_ADVISOR_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	auto space advisor maintenance program
<input type="radio"/>	AUTO_SQL_TUNING_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Program to run automatic sql tuning and SPM ev
<input type="radio"/>	BSLN_MAINTAIN_STATS_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Moving window baseline statistics maintenance p
<input type="radio"/>	FILE_WATCHER_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	File Watcher program
<input type="radio"/>	GATHER_STATS_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	Oracle defined automatic optimizer statistics colle
<input type="radio"/>	HS_PARALLEL_SAMPLING	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	
<input checked="" type="radio"/>	LOG_SESS_COUNT_PRGM	HR	<input checked="" type="checkbox"/>	PLSQL_BLOCK	
<input type="radio"/>	ORA\$AGE_AUTOTASK_DATA	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	deletes obsolete AUTOTASK repository data

- g. Click **Yes** to confirm.
 h. Navigate to **Administration > Oracle Scheduler > Schedules**.
 i. Select the **SESS_UPDATE_SCHED** schedule and click **Delete**. *Make sure that you do not delete the wrong schedule.*

Scheduler Schedules			
Select	Name	Schema	Start Date
<input type="radio"/>	DAILY_PURGE_SCHEDULE	SYS	
<input type="radio"/>	FILE_WATCHER_SCHEDULE	SYS	
<input type="radio"/>	PMO_DEFERRED_GIDX_MAINT_SCHED	SYS	
<input type="radio"/>	BSLN_MAINTAIN_STATS_SCHED	SYS	Jul 13, 2014 12:00:00 AM -07:00
<input checked="" type="radio"/>	SESS_UPDATE_SCHED	HR	Oct 21, 2014 1:32:50 PM +00:00

- j. Select “**If there are dependent objects, it will not be dropped**,” and then click **Yes** to confirm.

Confirmation

Are you sure you want to delete Schedule Attributes HR.SESSION_HISTORY_SCHED?

- Drop the schedule and all the dependent objects will be disabled.
 If there are dependent objects, it will not be dropped.

No Yes

- k. In your SQL*Plus session, as the `HR` user, delete the `SESSION_HISTORY` table, and then exit the session. Enter:

```
SQL> DROP TABLE SESSION_HISTORY PURGE;
```

Table dropped.

```
SQL> EXIT  
$
```

Practice 21-2: Creating Lightweight Scheduler Jobs

Overview

In this practice, you create and execute lightweight scheduler jobs.

Task

In this optional practice, you create and run a lightweight scheduler job. View the metadata for a lightweight scheduler job. Navigate to your \$LABS/P21 directory.

1. Create a job template for the lightweight job. The template must be a PL/SQL procedure or a PL/SQL block. Run the `cr_test_log.sql` script to create the `TEST_LOG` table. Then run `prog_1.sql`. The `prog_1.sql` script in the \$LABS/P21 directory creates a job template.

Note: The job template has a subset of the attributes of a scheduler program. Most of the attributes of a template cannot be changed for the job.

- a. Navigate to the \$LABS/P21 directory.

```
$ cd $LABS/P21  
$
```

- b. Execute the `cr_test_log.sql` and `prog_1.sql` scripts as the system user. The password for the system user is `oracle_4U`.

```
$ sqlplus system  
Enter password: oracle_4U <<< not displayed  
  
SQL> @cr_test_log.sql  
SQL> -- cleanup previous runs  
SQL> -- you will see an error the first time this script is run  
SQL> drop table system.test_log;  
drop table system.test_log  
*  
ERROR at line 1:  
ORA-00942: table or view does not exist  
  
SQL>  
SQL> -- create a table to hold timing information  
SQL>  
SQL> create table system.test_log  
2  (job_type      VARCHAR2(10),  
3   timemark      VARCHAR2(10),  
4   act_time      TIMESTAMP with TIME ZONE)  
5 /  
  
Table created.
```

```
SQL> @prog_1.sql
SQL> REM For training only
SQL> set echo on
SQL>
SQL> BEGIN
 2 -- This will produce an error the first
 3 -- time it is run since PROG_1 does not exist
 4
 5 DBMS_SCHEDULER.DROP_PROGRAM (
 6   program_name          => '"SYSTEM"."PROG_1"' );
 7 END;
 8 /
BEGIN
*
ERROR at line 1:
ORA-27476: "SYSTEM.PROG_1" does not exist
ORA-06512: at "SYS.DBMS_ISCHED", line 29
ORA-06512: at "SYS.DBMS_SCHEDULER", line 62
ORA-06512: at line 5

SQL> BEGIN
 2 DBMS_SCHEDULER.CREATE_PROGRAM(
 3   program_name=>'"SYSTEM"."PROG_1"'
 4   ,program_action=>'DECLARE
 5     time_now DATE;
 6   BEGIN
 7     INSERT INTO test_log
VALUES (''LWT'', ''DONE'', SYSTIMESTAMP);
 8   END; '
 9   , program_type=>'PLSQL_BLOCK'
10   , number_of_arguments=>0,
11   comments=>'Insert a timestamp into the test_log'
12   ,enabled=>TRUE);
13 END;
14 /
PL/SQL procedure successfully completed.

SQL>
```

2. Create a lightweight job by using the PL/SQL API. The job will run the `my_prog` template daily with an interval of 2, starting immediately.

Note: Enterprise Manager does not include the JOB_STYLE setting at this time.

While you are logged into SQL*Plus as the SYSTEM user, execute the my_lwt_job.sql script.

```
SQL> @my_lwt_job.sql
SQL> REM For training only
SQL> set echo on
SQL> BEGIN
 2      -- the drop procedure will give an error the first time
 3      -- this script is run
 4      sys.DBMS_SCHEDULER.DROP_JOB('my_lwt_job');
 5  END;
 6 /
BEGIN
*
ERROR at line 1:
ORA-27475: unknown job "SYSTEM"."MY_LWT_JOB"
ORA-06512: at "SYS.DBMS_ISCHED", line 232
ORA-06512: at "SYS.DBMS_SCHEDULER", line 778
ORA-06512: at line 4

SQL>
SQL> DECLARE
 2      jobname VARCHAR2(30);
 3  BEGIN
 4      -- Create the Job
 5      jobname := 'my_lwt_job';
 6      sys.dbms_scheduler.create_job(
 7          job_name => '"SYSTEM"."MY_LWT_JOB"',
 8          program_name => '"SYSTEM"."PROG_1"',
 9          job_class => '"DEFAULT_JOB_CLASS"',
10          job_style => 'LIGHTWEIGHT',
11          repeat_interval => 'FREQ=DAILY;INTERVAL=2',
12          comments => 'Lightweight job',
13          enabled => TRUE);
14  END;
15 /
```

PL/SQL procedure successfully completed.

```
SQL>
```

3. Verify that the job was created by querying the `USER_SCHEDULER_JOBS` view.

```
SQL> COL program_name format a12
SQL> COL job_name format a30
SQL> SELECT job_name, job_style, program_name
2  FROM USER_SCHEDULER_JOBS;

JOB_NAME          JOB_STYLE      PROGRAM_NAME
-----
MY_LWT_JOB        LIGHTWEIGHT    PROG_1

SQL>
```

4. Access the Enterprise Manager Cloud Control Scheduler Jobs page, find the `MY_LWT_JOB` job, and view the attributes.

- a. Navigate to **Administration > Oracle Scheduler > Jobs**. Then click the **History** tab. If you do not see `MY_LWT_JOB`, you can search for it by clicking the Lookup icon next to the Name field in the search region. Recall that the schema name is **SYSTEM**. Click **Go**.

- b. View the history of `MY_LWT_JOB`. Click the Job Name to view the job attributes.

Select	Status	Name	Schema	Completion Date	Run Duration (minutes)
<input checked="" type="radio"/>	✓	MY_LWT_JOB	SYSTEM	Oct 22, 2014 5:35:37 AM +00:00	0.0

- c. After reviewing the details, click **OK**.



Scheduler Jobs > View Job: SYSTEM.MY_LWT_JOB

View Job: SYSTEM.MY_LWT_JOB

Logged in as DBA1

General

- Name: MY_LWT_JOB
- Schema: SYSTEM
- Enabled: TRUE
- Description: None
- Logging Level: No logging (OFF)
- Job Class: DEFAULT_JOB_CLASS
- Auto Drop: TRUE
- Restartable: FALSE
- Destination:
- Credential Name:

Schedule

- Repeat By Days: Interval (Days) 2
- Repeat Time: Oct 22, 2014
- Available to Start: 5:35:37 AM Etc/UTC
- Not Available After:

Options

- Raise Events: None
- Maximum Run Duration (minutes): None
- Priority:
- Schedule Limit (minutes): None
- Maximum Runs: None
- Maximum Failures: None
- Job Weight: None
- Instance Stickiness: TRUE
- For use in RAC. If instance_stickiness is set to TRUE, the Oracle Scheduler will attempt to execute the job on the same instance as the previous run.

Command

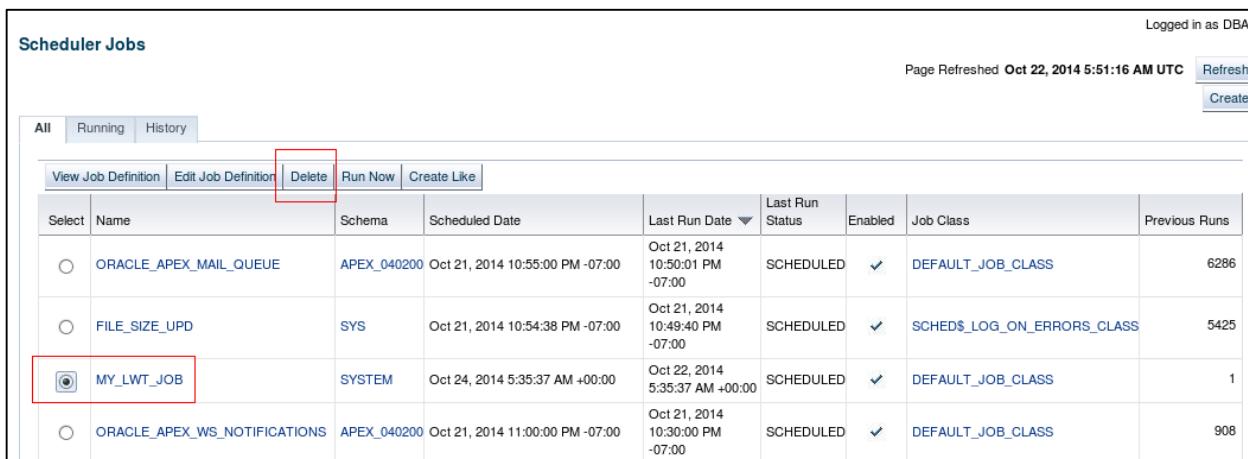
- Command Type: Program
- Program Name: SYSTEM.PROG_1

Operation Detail

View	Log ID	Log Date	Operation	Status
①	35048	Oct 22, 2014 5:35:37 AM +00:00	RUN	SUCCEEDED

5. On the Scheduler Jobs, All page, delete the MY_LWT_JOB job.

- a. Click the **All** tab on the Scheduler Jobs page. Select the MY_LWT_JOB job and click **Delete**. Hint: Sort by Last Run Date.



Scheduler Jobs

Logged in as DBA1

Page Refreshed Oct 22, 2014 5:51:16 AM UTC

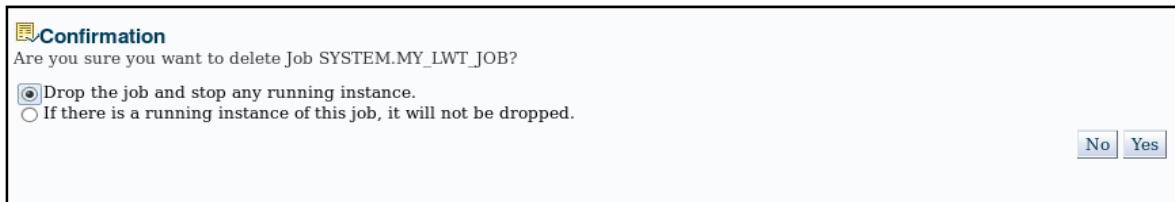
All Running History

Action Bar

- View Job Definition
- Edit Job Definition
- Delete** (highlighted with a red box)
- Run Now
- Create Like

Select	Name	Schema	Scheduled Date	Last Run Date	Last Run Status	Enabled	Job Class	Previous Runs
○	ORACLE_APEX_MAIL_QUEUE	APEX_040200	Oct 21, 2014 10:55:00 PM -07:00	Oct 21, 2014 10:50:01 PM -07:00	SCHEDULED	✓	DEFAULT_JOB_CLASS	6286
○	FILE_SIZE_UPD	SYS	Oct 21, 2014 10:54:38 PM -07:00	Oct 21, 2014 10:49:40 PM -07:00	SCHEDULED	✓	SCHED\$_LOG_ON_ERRORS_CLASS	5425
②	MY_LWT_JOB	SYSTEM	Oct 24, 2014 5:35:37 AM +00:00	Oct 22, 2014 5:35:37 AM +00:00	SCHEDULED	✓	DEFAULT_JOB_CLASS	1
○	ORACLE_APEX_WS_NOTIFICATIONS	APEX_040200	Oct 21, 2014 11:00:00 PM -07:00	Oct 21, 2014 10:30:00 PM -07:00	SCHEDULED	✓	DEFAULT_JOB_CLASS	908

- b. On the Confirmation page, select “**Drop the job and stop any running instance.**” Click **Yes**.



Confirmation

Are you sure you want to delete Job SYSTEM.MY_LWT_JOB?

Drop the job and stop any running instance.
 If there is a running instance of this job, it will not be dropped.

No **Yes**

Practice 21-3: Monitoring the Scheduler

Overview

In this practice, you view Scheduler components.

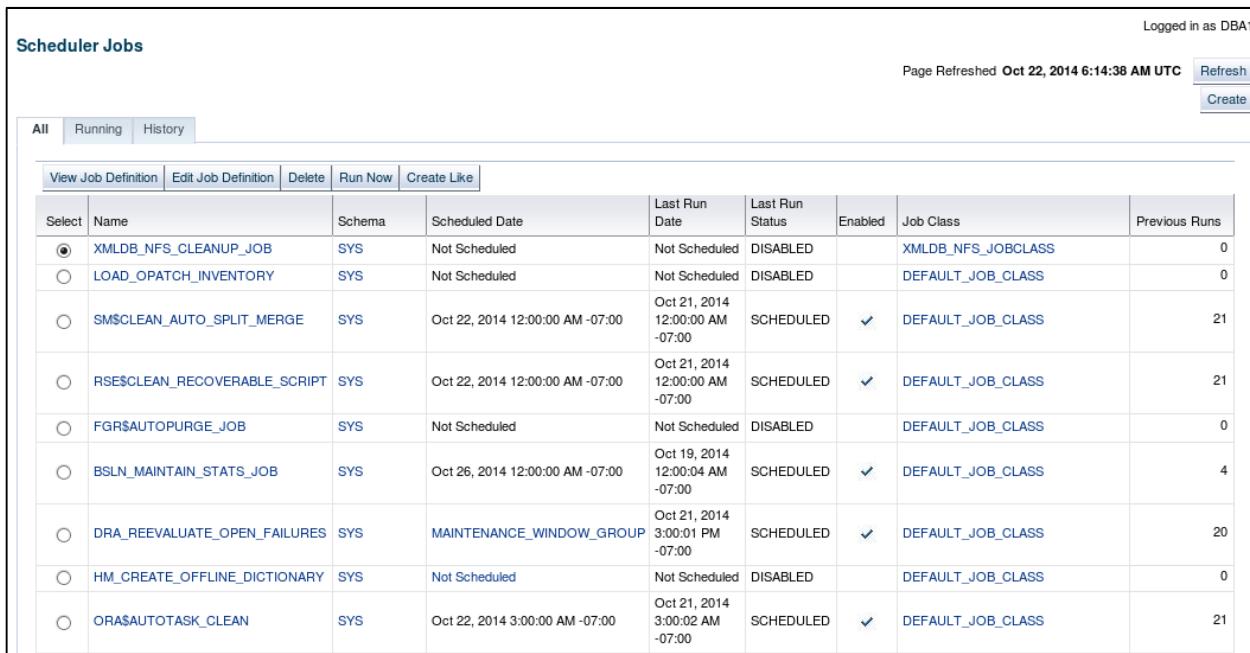
Tasks

In this practice, use Enterprise Manager Cloud Control to view Scheduler components. Click **Show SQL** regularly to review all statements that are new to you.

Log in as the DBA1 user (with `oracle_4U` password, connect as SYSDBA). Perform the necessary tasks either through Enterprise Manager Cloud Control or through SQL*Plus. All scripts for this practice are in the `$LABS/P21` directory.

1. Log in to the `orcl` database target as the DBA1 user with the `oracle_4U` password.
2. To view the Scheduler jobs, navigate to **Administration > Oracle Scheduler > Jobs**. Are there any jobs?

Answer: There are some jobs.



The screenshot shows the Scheduler Jobs page in Oracle Enterprise Manager Cloud Control. The page header includes "Scheduler Jobs", "Logged in as DBA1", "Page Refreshed Oct 22, 2014 6:14:38 AM UTC", "Refresh", and "Create". Below the header, there are tabs for "All", "Running", and "History", with "All" selected. A toolbar below the tabs includes "View Job Definition", "Edit Job Definition", "Delete", "Run Now", and "Create Like". The main table lists the following jobs:

Select	Name	Schema	Scheduled Date	Last Run Date	Last Run Status	Enabled	Job Class	Previous Runs
<input checked="" type="radio"/>	XMLDB_NFS_CLEANUP_JOB	SYS	Not Scheduled	Not Scheduled	DISABLED		XMLDB_NFS_JOBCLASS	0
<input type="radio"/>	LOAD_OPATCH_INVENTORY	SYS	Not Scheduled	Not Scheduled	DISABLED		DEFAULT_JOB_CLASS	0
<input type="radio"/>	SM\$CLEAN_AUTO_SPLIT_MERGE	SYS	Oct 22, 2014 12:00:00 AM -07:00	Oct 21, 2014 12:00:00 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	21
<input type="radio"/>	RSE\$CLEAN_RECOVERABLE_SCRIPT	SYS	Oct 22, 2014 12:00:00 AM -07:00	Oct 21, 2014 12:00:00 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	21
<input type="radio"/>	FGR\$AUTOPURGE_JOB	SYS	Not Scheduled	Not Scheduled	DISABLED		DEFAULT_JOB_CLASS	0
<input type="radio"/>	BSLN_MAINTAIN_STATS_JOB	SYS	Oct 26, 2014 12:00:00 AM -07:00	Oct 19, 2014 12:00:04 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	4
<input type="radio"/>	DRA_REEVALUATE_OPEN_FAILURES	SYS	MAINTENANCE_WINDOW_GROUP	Oct 21, 2014 3:00:01 PM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	20
<input type="radio"/>	HM_CREATE_OFFLINE_DICTIONARY	SYS	Not Scheduled	Not Scheduled	DISABLED		DEFAULT_JOB_CLASS	0
<input type="radio"/>	ORA\$AUTOTASK_CLEAN	SYS	Oct 22, 2014 3:00:00 AM -07:00	Oct 21, 2014 3:00:02 AM -07:00	SCHEDULED	<input checked="" type="checkbox"/>	DEFAULT_JOB_CLASS	21

3. Are there any programs? Navigate to **Administration > Oracle Scheduler > Programs**.

The screenshot shows the 'Scheduler Programs' page in the Oracle Database interface. At the top right, it says 'Logged in as DBA1'. Below the title, a message reads 'Following are the programs that define what are to be executed in the jobs.' A 'Create' button is located in the top right corner of the grid area. The main area is a table with columns: Select, Name, Schema, Enabled, Type, and Description. The table lists several programs, each with a radio button in the 'Select' column. The 'Name' column contains links to the programs. The 'Type' column indicates if they are 'STORED PROCEDURE' or 'PLSQL_BLOCK'. The 'Description' column provides a brief summary of each program's function.

Select	Name	Schema	Enabled	Type	Description
<input checked="" type="radio"/>	AQ\$_PROPAGATION_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	AQ propagation program
<input type="radio"/>	AUTO_SPACE_ADVISOR_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	auto space advisor maintenance program
<input type="radio"/>	AUTO_SQL_TUNING_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Program to run automatic sql tuning and SPM evolve tasks, see dbmssqlt.sql and dbmsspm.sql
<input type="radio"/>	BSLN_MAINTAIN_STATS_PROG	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Moving window baseline statistics maintenance program
<input type="radio"/>	FILE_WATCHER_PROGRAM	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	File Watcher program
<input type="radio"/>	GATHER_STATS_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	Oracle defined automatic optimizer statistics collection program
<input type="radio"/>	HS_PARALLEL_SAMPLING	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	
<input type="radio"/>	ORASAGE_AUTOTASK_DATA	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	deletes obsolete AUTOTASK repository data
<input type="radio"/>	PMO_DEFERRED_GIDX_MAINT	SYS	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Oracle defined automatic index cleanup for partition maintenance operations with deferred global index maintenance
<input type="radio"/>	PROG_1	SYSTEM	<input checked="" type="checkbox"/>	PLSQL_BLOCK	Insert a timestamp into the test_log
<input type="radio"/>	PURGE_LOG_PROG	SYS	<input checked="" type="checkbox"/>	STORED_PROCEDURE	purge log program

Answer: There are some existing programs.

4. Are there any schedules? Navigate to **Administration > Oracle Scheduler > Schedules**.

The screenshot shows the 'Scheduler Schedules' page in the Oracle Database interface. At the top right, it says 'Logged in as DBA1' and 'Page Refreshed Oct 22, 2014 6:18:36 AM UTC'. A 'Refresh' button is located at the top right of the grid area. The main area is a table with columns: Edit, View, Delete, Create Like, Name, Schema, Start Date, End Date, and Description. The table lists four schedules, each with a radio button in the 'Edit' column. The 'Name' column contains links to the schedules. The 'Start Date' and 'End Date' columns show specific dates and times. The 'Description' column provides a brief summary of each schedule's purpose.

Edit	View	Delete	Create Like	Name	Schema	Start Date	End Date	Description
<input checked="" type="radio"/>				DAILY_PURGE_SCHEDULE	SYS			
<input type="radio"/>				FILE_WATCHER_SCHEDULE	SYS			
<input type="radio"/>				PMO_DEFERRED_GIDX_MAINT_SCHED	SYS			
<input type="radio"/>				BSLN_MAINTAIN_STATS_SCHED	SYS	Jul 13, 2014 12:00:00 AM -07:00		Pre-defined schedule for computing moving window baseline statistics

Answer: There are four schedules: DAILY_PURGE_SCHEDULE, FILE_WATCHER_SCHEDULE, PMO_DEFERRED_GIDX_MAINT_SCHED and BSLN_MAINTAIN_STATS_SCHED.

5. List the Scheduler Windows. Are there any existing windows? Which resource plan is associated with each window? Navigate to **Administration > Oracle Scheduler > Windows**.

Logged in as DBA1

Scheduler Windows
Following are the system windows that specify resource usage limits based on time-duration windows.

[Create](#)

View	Edit	Delete	Create Like ▾	Go				
Select	Name	Resource Plan	Enabled	Next Open Date	End Date	Duration (min)	Active	Description
<input checked="" type="radio"/>	WEEKNIGHT_WINDOW			Jul 7, 2014 10:00:00 PM		480	FALSE	Weeknight window - for compatibility only
<input type="radio"/>	WEEKEND_WINDOW			Jul 12, 2014 12:00:00 AM		2880	FALSE	Weekend window - for compatibility only
<input type="radio"/>	WEDNESDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 22, 2014 10:00:00 PM		240	FALSE	Wednesday window for maintenance tasks
<input type="radio"/>	THURSDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 23, 2014 10:00:00 PM		240	FALSE	Thursday window for maintenance tasks
<input type="radio"/>	FRIDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 24, 2014 10:00:00 PM		240	FALSE	Friday window for maintenance tasks
<input type="radio"/>	SATURDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 25, 2014 6:00:00 AM		1200	FALSE	Saturday window for maintenance tasks
<input type="radio"/>	SUNDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 26, 2014 6:00:00 AM		1200	FALSE	Sunday window for maintenance tasks
<input type="radio"/>	MONDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 27, 2014 10:00:00 PM		240	FALSE	Monday window for maintenance tasks
<input type="radio"/>	TUESDAY_WINDOW	DEFAULT_MAINTENANCE_PLAN	<input checked="" type="checkbox"/>	Oct 28, 2014 10:00:00 PM		240	FALSE	Tuesday window for maintenance tasks

Answer: There are several windows. All are enabled, except WEEKNIGHT_WINDOW and WEEKEND_WINDOW.

6. Click the MONDAY_WINDOW link. Answer the questions, and then click **OK**.

Scheduler Windows > View Window: MONDAY_WINDOW
View Window: MONDAY_WINDOW

Name	MONDAY_WINDOW
Resource Plan	DEFAULT_MAINTENANCE_PLAN
Enabled	TRUE
Priority	LOW
Description	Monday window for maintenance tasks
Schedule	
Repeat	By Weeks
Interval (Weeks)	1
Days of Week	Monday
Repeat Time	Hour:10 Minute:00 Second:00 PM
Duration (min)	4 hour(s) 0 minute(s)
Available to Start	
Not Available After	

Question 1: At which time does this window open? **10 PM**

Question 2: For how long does it stay open? **4 hours**

7. List the Scheduler Job Classes. Are there any Job Classes? Navigate to **Administration > Oracle Scheduler > Job Classes**.

The screenshot shows the 'Scheduler Job Classes' page. At the top right, it says 'Logged in as DBA1'. Below that is a message: 'A job class defines the resource consumer group in which a job will run. Using a resource plan in a window, a DBA can allocate resources among different resource groups and between different job classes.' There is a 'Create' button on the right. A toolbar at the top has buttons for 'Edit', 'View', 'Delete', and 'Create Like'. The main area is a table with columns: Select, Name, Logging Level, Log Retention Period (Days), Resource Consumer Group, Service Name, and Description. The table lists several job classes:

Select	Name	Logging Level	Log Retention Period (Days)	Resource Consumer Group	Service Name	Description
<input checked="" type="radio"/>	XMLDB_NFS_JOBCLASS	FAILED RUNS				
<input type="radio"/>	AQ\$_PROPAGATION_JOB_CLASS	RUNS				Default job class for AQ propagation jobs
<input type="radio"/>	ORA\$AT_JCMED_SQ	FULL	1000000	ORA\$AUTOTASK		sql tuning advisor
<input type="radio"/>	ORA\$AT_JCNRM_SQ	FULL	1000000	ORA\$AUTOTASK		sql tuning advisor
<input type="radio"/>	ORA\$AT_JCURG_SQ	FULL	1000000	ORA\$AUTOTASK		sql tuning advisor
<input type="radio"/>	ORA\$AT_JCMED_SA	FULL	1000000	ORA\$AUTOTASK		auto space advisor
<input type="radio"/>	ORA\$AT_JCNRM_SA	FULL	1000000	ORA\$AUTOTASK		auto space advisor
<input type="radio"/>	ORA\$AT_JCURG_SA	FULL	1000000	ORA\$AUTOTASK		auto space advisor
<input type="radio"/>	ORA\$AT_JCMED_OS	FULL	1000000	ORA\$AUTOTASK		auto optimizer stats collection
<input type="radio"/>	ORA\$AT_JCNRM_OS	FULL	1000000	ORA\$AUTOTASK		auto optimizer stats collection
<input type="radio"/>	ORA\$AT_JCURG_OS	FULL	1000000	ORA\$AUTOTASK		auto optimizer stats collection
<input type="radio"/>	DBMS_JOB\$	OFF				This is the job class for jobs created through DBMS_JOB.
<input type="radio"/>	SCHED\$_LOG_ON_ERRORS_CLASS	FAILED RUNS				This is the default job class if you want minimal logging.
<input type="radio"/>	DEFAULT_JOB_CLASS	RUNS				This is the default job class.

Answer: There are many job classes.

Question 2: Which resource consumer group is associated with the **DEFAULT_JOB_CLASS** job class?

Possible Answer: None

8. On the Scheduler Job classes page, click the [ORA\\$AT_JCURG_OS](#) link.

The screenshot shows the 'View Job Class:ORA\$AT_JCURG_OS' page. It displays the following configuration details:

- Name:** ORA\$AT_JCURG_OS
- Logging Level:** Log everything (FULL)
- Log Retention Period (Days):** 1000000
- Resource Consumer Group:** ORA\$AUTOTASK
- Service Name:**
- Description:** auto optimizer stats collection

Question 1: Which resource consumer group is associated with the job class?

Answer: ORA\$AT_JCURG_OS is associated with ORA\$AUTOTASK.

Question 2: For which task is this job class used?

Answer: For automatic optimizer statistics collection

9. Click **OK**, and then log out of Enterprise Manager Cloud Control.