

Oracle Database 11g: RAC Administration

Activity Guide

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Appendix A

Practices and Solutions

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Practices for Lesson 1

In this practice, you will install Grid Infrastructure 11g Release 2 on your three nodes.

Practice 1-1: Installing Oracle Grid Infrastructure

In this practice, you will install the Oracle Grid Infrastructure 11g Release 2 software on three nodes.

- 1) SSH to host01 as the root user and run the `env_prep.sh` script from the `/home/oracle/labs/less_01` directory on all three of your nodes.

```
[root@host01 ~]# cat /home/oracle/labs/less_01/env_prep.sh

#!/bin/bash

[ `whoami` = "root" ] || { echo "You must be root to run this script"
exit
}
echo "Adding groups oper, asmdba, asmoper, and asmadmin"

groupadd -g 503 oper
groupadd -g 505 asmdba
groupadd -g 506 asmoper
groupadd -g 504 asmadmin

echo "Preparing oracle, oinstall, and grid user accounts"

grep -q grid /etc/passwd
UserGridExists=$?
if [[ $UserGridExists == 0 ]]; then
usermod -g oinstall -G asmoper,asmdba,asmadmin grid
else
useradd -u 502 -g oinstall -G asmoper,asmdba,asmadmin grid
fi
echo oracle | passwd --stdin grid
usermod -g oinstall -G dba,oper,asmdba oracle

echo "Preparing directories for Grid software installation"

mkdir -p /u01/app/grid
chown -R grid:oinstall /u01/app
chmod -R 775 /u01/app/grid
mkdir -p /u01/app/oracle
chown -R oracle:oinstall /u01/app/oracle

echo "Starting local naming cache daemon, NSCD"

service nscd start
chkconfig nscd

echo "Modifying kernel settings for oracle and grid users"
cp /home/oracle/labs/less_01/profile /etc/profile
cp /home/oracle/labs/less_01/bash_profile
/home/oracle/.bash_profile
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
cp /home/oracle/labs/less_01/bash_profile
/home/grid/.bash_profile
cp /home/oracle/labs/less_01/limits.conf
/etc/security/limits.conf

[root@host01 ~]# /home/oracle/labs/less_01/env_prep.sh
...
[root@host01 ~]# ssh host02
home/oracle/labs/less_01/env_prep.sh

[root@host01 ~]# ssh host03
home/oracle/labs/less_01/env_prep.sh
```

- 2) As root, execute the `oracleasm configure -i` command to configure the Oracle ASM library driver. The owner should be `grid` and the group should be `asmadmin`. Make sure that the driver loads and scans disks on boot. **Perform this step on all three of your nodes.**

```
<<< On Node 1 >>>
[root@host01 ~]# oracleasm configure -i
Configuring the Oracle ASM library driver.

This will configure the on-boot properties of the Oracle ASM
library
driver. The following questions will determine whether the
driver is
loaded on boot and what permissions it will have. The current
values
will be shown in brackets ('[]'). Hitting <ENTER> without
typing an
answer will keep that current value. Ctrl-C will abort.

Default user to own the driver interface []: grid
Default group to own the driver interface []: asmadmin
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]: y
Writing Oracle ASM library driver configuration: done

<<< On Node 2 >>>
[root@host01 ~]# ssh host02 oracleasm configure -i

... output not shown

<<< On Node 3 >>>
[root@host01 ~]# ssh host03 oracleasm configure -i

... output not shown
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

- 3) As root, execute the `/home/oracle/labs/less_01/createdisk.sh` command to create the ASM disks needed for the practices. Look at the script, and then execute it as the root user. **Perform this step on the first node only.**

```
[root@host01 less_01]# cat
/home/oracle/labs/less_01/createdisk.sh

#!/bin/bash

[ `whoami` = "root" ] || { echo "You must be root to run this
script"
exit
}

oracleasm init
oracleasm createdisk ASMDISK01 /dev/xvdf1
oracleasm createdisk ASMDISK02 /dev/xvdf2
oracleasm createdisk ASMDISK03 /dev/xvdf3
oracleasm createdisk ASMDISK04 /dev/xvdf5
oracleasm createdisk ASMDISK05 /dev/xvdf6
oracleasm createdisk ASMDISK06 /dev/xvdf7
oracleasm createdisk ASMDISK07 /dev/xvdf8
oracleasm createdisk ASMDISK08 /dev/xvdf9
oracleasm createdisk ASMDISK09 /dev/xvdf10
oracleasm createdisk ASMDISK10 /dev/xvdf11
oracleasm createdisk ASMDISK11 /dev/xvdg1
oracleasm createdisk ASMDISK12 /dev/xvdg2
oracleasm createdisk ASMDISK13 /dev/xvdg3
oracleasm createdisk ASMDISK14 /dev/xvdg5
oracleasm scandisks
oracleasm listdisks
ssh host02 "oracleasm exit;oracleasm init;oracleasm
scandisks;oracleasm listdisks"
ssh host03 "oracleasm exit;oracleasm init;oracleasm
scandisks;oracleasm listdisks"

[root@host01 ~]# /home/oracle/labs/less_01/createdisk.sh
Creating /dev/oracleasm mount point: /dev/oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMLib driver filesystem: /dev/oracleasm
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
```


Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
Writing disk header: done
Instantiating disk: done
ASMDISK01
ASMDISK02
ASMDISK03
ASMDISK04
ASMDISK05
ASMDISK06
ASMDISK07
ASMDISK08
ASMDISK09
ASMDISK10
ASMDISK11
ASMDISK12
ASMDISK13
ASMDISK14
root@host02's password:
Unmounting ASMLib driver filesystem: /dev/oracleasm
Unloading module "oracleasm": oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMLib driver filesystem: /dev/oracleasm
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
Instantiating disk "ASMDISK01"
Instantiating disk "ASMDISK02"
Instantiating disk "ASMDISK03"
Instantiating disk "ASMDISK04"
Instantiating disk "ASMDISK05"
Instantiating disk "ASMDISK06"
Instantiating disk "ASMDISK07"
Instantiating disk "ASMDISK08"
Instantiating disk "ASMDISK09"
Instantiating disk "ASMDISK10"
Instantiating disk "ASMDISK11"
Instantiating disk "ASMDISK12"
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
Instantiating disk "ASMDISK13"
Instantiating disk "ASMDISK14"
ASMDISK01
ASMDISK02
ASMDISK03
ASMDISK04
ASMDISK05
ASMDISK06
ASMDISK07
ASMDISK08
ASMDISK09
ASMDISK10
ASMDISK11
ASMDISK12
ASMDISK13
ASMDISK14
root@host03's password:
Unmounting ASMLib driver filesystem: /dev/oracleasm
Unloading module "oracleasm": oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMLib driver filesystem: /dev/oracleasm
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
Instantiating disk "ASMDISK01"
Instantiating disk "ASMDISK02"
Instantiating disk "ASMDISK03"
Instantiating disk "ASMDISK04"
Instantiating disk "ASMDISK05"
Instantiating disk "ASMDISK06"
Instantiating disk "ASMDISK07"
Instantiating disk "ASMDISK08"
Instantiating disk "ASMDISK09"
Instantiating disk "ASMDISK10"
Instantiating disk "ASMDISK11"
Instantiating disk "ASMDISK12"
Instantiating disk "ASMDISK13"
Instantiating disk "ASMDISK14"
ASMDISK01
ASMDISK02
ASMDISK03
ASMDISK04
ASMDISK05
ASMDISK06
ASMDISK07
ASMDISK08
ASMDISK09
ASMDISK10
ASMDISK11
ASMDISK12
ASMDISK13
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
ASMDISK14
```

```
[root@host01 ~]#
```

- 4) From your classroom PC desktop, execute `ssh -X grid@host01` to open a terminal session on host01 as the grid user.

```
[root@classroom_pc ~]# ssh -X grid@host01
grid@host01's password:
/usr/bin/xauth: creating new authority file
/home/grid/.Xauthority
[grid@host01 ~]$
```

- 5) Use the Oracle Universal Installer (runInstaller) to install Oracle Grid Infrastructure.

- Your assigned cluster nodes are **host01**, **host02**, and **host03**.
- Your cluster name is **cluster01**
- Your SCAN is **cluster01-scan**
- Your Oracle Grid Infrastructure software location is `/stage/grid`

- 1) Before starting the installation, make sure that the DNS server can resolve your SCAN to three IP addresses.

```
[grid@host01 ~]$ nslookup cluster01-scan
Server:      192.0.2.1
Address:     192.0.2.1#53

Name:   cluster01-scan.example.com
Address: 192.0.2.112
Name:   cluster01-scan.example.com
Address: 192.0.2.113
Name:   cluster01-scan.example.com
Address: 192.0.2.111
```

- 2) Change directory to the staged software location and start the OUI by executing the `runInstaller` command from the `/stage/grid` directory.

```
[grid@host01 ~]$ id
uid=502(grid) gid=54321(oinstall)
groups=504(asmadmin),505(asmdba),506(asmoper),54321(oinstall)

[grid@host01 ~]$ cd /stage/grid

[grid@host01 ~]$ ./runInstaller
```

- 3) On the Download Software Updates page, select Skip Software Updates and click Next.

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

- 4) On the Select Installation Option page, select the “Install and Configure Oracle Grid Infrastructure for a Cluster” option and click Next.
- 5) On the Select Installation Type page, select Advanced Installation and click Next.
- 6) On the Select Product Languages page, select all languages and click Next.
- 7) The “Grid Plug and Play Information” page appears next. Uncheck the Configure GNS check box. When you do this, the GNS Sub Domain and GNS VIP Address fields will be grayed out. You must input:
 - Cluster Name: **cluster01**
 - SCAN Name **cluster01-scan**
 - SCAN Port **1521** (default value)

Input the proper data carefully. **DO NOT GUESS** here. If you are unsure of a value, **PLEASE ASK YOUR INSTRUCTOR**.

Hint: If you enter the cluster name (for example, cluster01), the SCAN name will auto-fill correctly. Leave SCAN Port to default to 1521. Verify all data entered on this page, and then click Next.

- 8) On the Cluster Node Information page, you add **your second node and third nodes**.
 - i) Click the Add button and enter the fully qualified name of your second node (host02.example.com) and the fully qualified host VIP address (host02-vip.example.com) into the box and click OK. Your second node should appear in the window under your first node.
 - ii) Click the Add button and enter the fully qualified name of your third node (host03.example.com) and the fully qualified host VIP address (host03-vip.example.com) into the box and click OK. Your third node should appear in the window under your first node.
 - iii) Click the SSH Connectivity button. Enter the grid password, which is `oracle`. Click the Setup button. A dialog box stating that you have successfully established passwordless SSH connectivity appears. Click OK to close the dialog box. Click Next to continue.
- 9) On the Specify Network Interface Usage page, you must configure the correct interface types for the listed network interface. Select **public** for **eth0**. To configure HAIP for the cluster interconnects, select **private** for both **eth1** and **eth2**. If you are unsure, check with your instructor for proper network interface usage. When you have correctly assigned the interface types, click Next to continue.
- 10) On the Storage Option Information page, select Oracle Automatic Storage Management (ASM) and click Next.

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

- 11) On the Create ASM Disk Group page, make sure that Disk Group Name is DATA and Redundancy is Normal. In the Add Disks region, select ORCL:ASMDISK01 ORCL:ASMDISK02, ORCL:ASMDISK03, and ORCL:ASMDISK04. Click Next.
- 12) On the Specify ASM Passwords page, click the Use Same Password for these accounts button. In the Specify Password field, enter **oracle_4U** and confirm it in the Confirm Password field. Click Next to continue.
- 13) Select the “Do not use Intelligent Platform Management Interface (IPMI)” option on the Failure Isolation Support page and click Next to continue.
- 14) On the Privileged Operating System Groups page, select “asmdba” for the ASM Database Administrator (OSDBA) group, “asmoper” for the ASM Instance Administration Operator (OSOPER) group, and “asmadmin” for the ASM Instance Administrator (OSASM) group. Click Next to continue.
- 15) On the Specify Installation Location page, make sure that Oracle Base is /u01/app/grid and Software Location is /u01/app/11.2.0/grid. Click Next.
- 16) On the Create Inventory page, Inventory Directory should be /u01/app/oraInventory and the oraInventory Group Name should be oinstall. Click Next.
- 17) On the Perform System Prerequisites Check page, the Installer checks whether all the systems involved in the installation meet the minimum system requirements for that platform. If the check is successful, click Next. If any deficiencies are found, click the “Fix & Check Again” button. Most likely, you will receive a “Device Checks for ASM” warning. This can be safely ignored. Click the Ignore All check box, and then click Next to continue.
- 18) Click Install on the Summary screen. From this screen, you can monitor the progress of the installation.
- 19) When the remote operations have finished, the Execute Configuration Scripts window appears. You are instructed to run the orainstRoot.sh and root.sh scripts as the root user on all nodes. Open a terminal window and as the root user set the classroom environment variables. **Note:** You must wait until the root.sh script finishes running on the first node before executing it on the second node.

(On the first node)

```
[root@host01 ~]# /u01/app/oraInventory/orainstRoot.sh
Changing permissions of /u01/app/oraInventory.
Adding read,write permissions for group.
Removing read,write,execute permissions for world.

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

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
[root@host01 ~]# /u01/app/11.2.0/grid/root.sh
./root.sh
Performing root user operation for Oracle 11g

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

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

Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
Creating trace directory
User ignored Prerequisites during installation
OLR initialization - successful
    root wallet
    root wallet cert
    root cert export
    peer wallet
    profile reader wallet
    pa wallet
    peer wallet keys
    pa wallet keys
    peer cert request
    pa cert request
    peer cert
    pa cert
    peer root cert TP
    profile reader root cert TP
    pa root cert TP
    peer pa cert TP
    pa peer cert TP
    profile reader pa cert TP
    profile reader peer cert TP
    peer user cert
    pa user cert
Adding Clusterware entries to inittab
CRS-2672: Attempting to start 'ora.mdnsd' on 'host01'
CRS-2676: Start of 'ora.mdnsd' on 'host01' succeeded
CRS-2672: Attempting to start 'ora.gpnpd' on 'host01'
CRS-2676: Start of 'ora.gpnpd' on 'host01' succeeded
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
CRS-2672: Attempting to start 'ora.cssdmonitor' on 'host01'
CRS-2672: Attempting to start 'ora.gipcd' on 'host01'
CRS-2676: Start of 'ora.gipcd' on 'host01' succeeded
CRS-2676: Start of 'ora.cssdmonitor' on 'host01' succeeded
CRS-2672: Attempting to start 'ora.cssd' on 'host01'
CRS-2672: Attempting to start 'ora.diskmon' on 'host01'
CRS-2676: Start of 'ora.diskmon' on 'host01' succeeded
CRS-2676: Start of 'ora.cssd' on 'host01' succeeded

ASM created and started successfully.

Disk Group DATA created successfully.

clscfg: -install mode specified
Successfully accumulated necessary OCR keys.
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
CRS-4256: Updating the profile
Successful addition of voting disk
a76bb6f3c5a64f75bf38af49001577fa.
Successful addition of voting disk
0ff19e4eaaf14f40bf72b5ed81165ff5.
Successful addition of voting disk
40747dc0eca34f2fbf3bc84645f455c3.
Successfully replaced voting disk group with +DATA.
CRS-4256: Updating the profile
CRS-4266: Voting file(s) successfully replaced
## STATE File Universal Id File Name Disk
group
--
1. ONLINE a76bb6f3c5a64f75bf38af49001577fa (ORCL:ASMDISK01)
[DATA]
2. ONLINE 0ff19e4eaaf14f40bf72b5ed81165ff5 (ORCL:ASMDISK02)
[DATA]
3. ONLINE 40747dc0eca34f2fbf3bc84645f455c3 (ORCL:ASMDISK03)
[DATA]
Located 3 voting disk(s).
CRS-2672: Attempting to start 'ora.asm' on 'host01'
CRS-2676: Start of 'ora.asm' on 'host01' succeeded
CRS-2672: Attempting to start 'ora.DATA.dg' on 'host01'
CRS-2676: Start of 'ora.DATA.dg' on 'host01' succeeded

Configure Oracle Grid Infrastructure for a Cluster ...
succeeded
#

(On the second node AFTER the root.sh script finishes on the first node)
[root@host01 ~]# ssh host02
/u01/app/oraInventory/orainstRoot.sh
root's password: Oracle << password not displayed
Changing permissions of /u01/app/oraInventory.
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
Adding read,write permissions for group.
Removing read,write,execute permissions for world.

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

[root@host01 ~]# ssh host02 /u01/app/11.2.0/grid/root.sh
root's password: Oracle    << password not displayed

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

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

Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
Creating trace directory
User ignored Prerequisites during installation
OLR initialization - successful
Adding Clusterware entries to inittab
CRS-4402: The CSS daemon was started in exclusive mode but
found an active CSS daemon on node host01, number 1, and is
terminating
An active cluster was found during exclusive startup,
restarting to join the cluster
Configure Oracle Grid Infrastructure for a Cluster ...
succeeded

(On the third node AFTER the root.sh script finishes on the second node)
[root@host01 ~]# ssh host03
/u01/app/oraInventory/orainstRoot.sh
root's password: Oracle    << password not displayed
Changing permissions of /u01/app/oraInventory.
Adding read,write permissions for group.
Removing read,write,execute permissions for world.

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

[root@host01 ~]# ssh host03 /u01/app/11.2.0/grid/root.sh
```


Practice 1-1: Installing Oracle Grid Infrastructure (continued)

```
root's password: Oracle    << password not displayed

Performing root user operation for Oracle 11g

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

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

Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
Creating trace directory
User ignored Prerequisites during installation
OLR initialization - successful
Adding Clusterware entries to inittab
CRS-4402: The CSS daemon was started in exclusive mode but
found an active CSS daemon on node host01, number 1, and is
terminating
An active cluster was found during exclusive startup,
restarting to join the cluster
Configure Oracle Grid Infrastructure for a Cluster ...
succeeded
You have new mail in /var/spool/mail/root
```

- 20) After the scripts are executed on all nodes, click the OK button to close the dialog box. The configuration assistants will continue to execute from the Setup page.
- 21) When the configuration assistants have finished, click the Close button on the Finish page to exit the Installer.
- 6) When the installation finishes, you should verify the installation. You should check to make sure that the software stack is running, as it should. Execute the `crsctl stat res -t` command:

```
[grid@host01 ~]$ /u01/app/11.2.0/grid/bin/crsctl stat res -t

-----
NAME                                TARGET    STATE        SERVER        STATE_DETAILS
-----
```

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

Local Resources			

ora.DATA.dg	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.LISTENER.lsnr	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.asm	ONLINE	ONLINE	host01
Started	ONLINE	ONLINE	host02
Started	ONLINE	ONLINE	host03
Started			
ora.gsd	OFFLINE	OFFLINE	host01
	OFFLINE	OFFLINE	host02
	OFFLINE	OFFLINE	host03
ora.net1.network	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.ons	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03

Cluster Resources			

ora.LISTENER_SCAN1.lsnr			
1	ONLINE	ONLINE	host02
ora.LISTENER_SCAN2.lsnr			
1	ONLINE	ONLINE	host03
ora.LISTENER_SCAN3.lsnr			
1	ONLINE	ONLINE	host01
ora.cvu			
1	ONLINE	ONLINE	host01
ora.host01.vip			
1	ONLINE	ONLINE	host01
ora.host02.vip			
1	ONLINE	ONLINE	host02
ora.host03.vip			
1	ONLINE	ONLINE	host03
ora.oc4j			
1	ONLINE	ONLINE	host01
ora.scan1.vip			
1	ONLINE	ONLINE	host02
ora.scan2.vip			

Practice 1-1: Installing Oracle Grid Infrastructure (continued)

1	ONLINE	ONLINE	host03
ora.scan3.vip			
1	ONLINE	ONLINE	host01

Practice 1-2: Creating Additional ASM Disk Groups

In this practice, you create additional ASM disk groups to support the activities in the rest of the course. You create a disk group to hold the fast recovery area (FRA) and another disk group to hold ACFS file systems.

- 1) Using the same terminal window used to install Grid Infrastructure as the `grid` user, set the environment with the `oraenv` tool to the `+ASM1` instance.

```
[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid
```

- 2) Start the ASM Configuration Assistant (ASMCA).

```
[grid@host01 ~]$ asmca
```

- 3) Create a disk group named FRA with four disks and external redundancy—choose disks ASMDISK05 through ASMDISK08.

Step	Screen/Page Description	Choices or Values
a.	Configure ASM :DiskGroups	Click Create.
b.	Create DiskGroup	Enter: Disk Group Name: FRA In the Redundancy section, select “External (None).” In the Select Member Disk section, select: ASMDISK05 ASMDISK06 ASMDISK07 ASMDISK08 Click OK.
c.	Disk Group:Creation	Click OK. Exit ASMCA when finished.

Practices for Lesson 3

In this practice, you will install the Oracle Database 11g Release 2 software and create a three-node cluster database.

Practice 3-1: Installing the Oracle Database Software

In this practice, you will install the Oracle Database 11g Release 2 software on three nodes.

- 1) From your classroom PC desktop, execute `ssh -X oracle@host01` to open a terminal session on host01 as the oracle user.

```
[vncuser@classroom_pc ~]# ssh -X oracle@host01
oracle@host01's password:
/usr/bin/xauth: creating new authority file
/home/grid/.Xauthority
[oracle@host01 ~]$
```

- 2) Confirm that you are connected as the oracle user with the proper group memberships. Change directory to the staged software location and start the OUI by executing the `runInstaller` command from the `/stage/database` directory.

```
[oracle@host01 ~]$ id
uid=501(oracle) gid=502(oinstall)
groups=501(dba),502(oinstall),503(oper),505(asmdba)
[oracle@host01 ~]$ cd /stage/database

[oracle@host01 ~]$ ./runInstaller
```

- 1) On the Configure Security Updates page, deselect the “I wish to receive security updates” check box and click Next. A dialog box appears making sure that you want to remain uninformed about the updates. Click Yes to dismiss the box.
Note: If this were a production machine or part of an important test environment, you might consider this option.
- 2) On the Download Software Updates page, select “Skip software updates” and click Next.
- 3) On the Select Installation Option page, select the “Install database software only” option and click Next.
- 4) On the Node Selection page, select Real Application Clusters database installation. Select all three of your assigned hosts and click Next. If the ssh connectivity test fails, click the SSH Connectivity button. Enter the password `oracle` for the oracle user. Select the Reuse public and private keys check box and click the Setup button. After the setup completes, click Next to continue.
- 5) On the Select Product Languages, promote all languages from the Available Languages window to the Selected Languages window on the right-hand side. Click Next to continue.
- 6) On the Select Database Edition, select Enterprise Edition and click Next to continue.

Practice 3-1: Installing the Oracle Database Software (continued)

- 7) On the Specify Installation edition, the Oracle Base should be `/u01/app/oracle` and the Software Location should be `/u01/app/oracle/product/11.2.0/dbhome_1`. Do not install the database to a shared location. Click Next to continue.
- 8) On the Privileged Operating System Groups, select dba as the Database Administrator Group and oper as the Database Operator Group. Click Next to continue.
- 9) When the prerequisites have successfully been checked on the Perform Prerequisites Check page, click Next to continue. If any checks fail, click the Fix and Check Again button. Run the scripts on the cluster nodes as root as directed, and then click Next.
- 10) Check the information on the Summary page and click Install.
- 11) The Install Progress screen allows you to monitor the progression of the installation.
- 12) When the files have been copied to all nodes, the Execute Configuration Scripts window is presented. Execute the `/u01/app/oracle/product/11.2.0/dbhome_1/root.sh` script on **all three nodes**.

```
[root@host01 ~]#
/u01/app/oracle/product/11.2.0/dbhome_1/root.sh
Performing root user operation for Oracle 11g

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

Enter the full pathname of the local bin directory:
[/usr/local/bin]:
...

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

[root@host01 ~]# ssh host02
/u01/app/oracle/product/11.2.0/dbhome_1/root.sh
root's password: Oracle      << password not displayed
Performing root user operation for Oracle 11g

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

Practice 3-1: Installing the Oracle Database Software (continued)

```
Enter the full pathname of the local bin directory:
[/usr/local/bin]:
...

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

[root@host01 ~]# ssh host03
/u01/app/oracle/product/11.2.0/dbhome_1/root.sh
root's password: Oracle    << password not displayed
Performing root user operation for Oracle 11g

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

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

[root@host01 ~]#
```

- 13) When you have run the `root.sh` scripts on all three nodes, click the OK button to close the Execute Configuration Scripts window.
- 14) Click the Close button on the Finish page to complete the installation and exit the Installer.

Practice 3-2: Creating a RAC Database

In this practice, you will create a three-node RAC database.

- 1) From the `oracle` terminal session that you used to install the database software in the preceding practice, change directory to `/u01/app/oracle/product/11.2.0/dbhome_1/bin` and launch the Database Configuration Assistant by executing the `dbca` command.

```
[oracle@host01 ~]$ id
uid=500(oracle) gid=501(oinstall)
groups=500(dba),501(oinstall),502(oper),505(asmdba)

[oracle@host01 ~]$ cd
/u01/app/oracle/product/11.2.0/dbhome_1/bin

[oracle@host01 bin]$ ./dbca
```

- 1) On the Welcome page, select Oracle Real Application Clusters database and click Next.
- 2) On the Operations page, select “Create a Database” and click Next.
- 3) On the Database Templates page, select the General Purpose or Transaction Processing template. Click Next to continue.
- 4) On the Database Identification page, select Admin-Managed and enter **orcl** in the Global Database Name field. Click the Select All button to install the database to all three of your nodes and click Next.
- 5) On the Management Options page, make sure that the Configure Enterprise Manager check box is selected and the “Configure Database Control for local management” option is selected. Click Next to continue.
- 6) Select “Use the Same Administrative Password for All Accounts” on the Database Credentials page. Enter `oracle_4U` in the Password and Confirm Password fields and click Next.
- 7) On Database File locations, you can specify your storage type and location for your database files. Select Automatic Storage Management (ASM) from the drop-down list for Storage Type. Select Use Oracle-Managed Files and make sure that the Database Area value is +DATA. Click Next to continue.
- 8) When the ASM Credentials box appears, enter the ASM password that you used during the clusterware installation practice. The password should be `oracle_4U`. Enter the correct password and click OK to close the box.
- 9) On the Recovery Configuration page, enter +FRA in the Recovery Area field and accept the default for the Recovery Area Size. Click Next to continue.
- 10) On the Database Content page, select the Sample Schemas check box and click Next.

Practice 3-2: Creating a RAC Database (continued)

- 11) On the Memory tabbed page of the Initialization Parameters page, make sure that you enter 550 in the Memory Size (SGA and PGA) field. Then click the Character Sets tab, and select “Use Unicode on the Database Character Set tabbed page.” Click Next.
- 12) Accept the default values on the Database Storage page and click Next to continue.
- 13) Select Create Database on the Creation Options page and click Finish.
- 14) On the Database Configuration Assistant: Summary page, click OK.
- 15) You can monitor the database creation progress from the Database Configuration Assistant window.
- 16) At the end of the installation, a dialog box with your database information including the Database Control URL is displayed. Click Exit. This will close the dialog box and end the Database Configuration Assistant.
- 17) Open a browser and enter the Database Control URL displayed in the previous step. The first time you access Database Control, you will be presented with a Secure Connection Failed dialog box. Click the “Or you can add an exception” link. Next, the Secure Connection Failed dialog box appears. Click Add Exception. In the Add Security Exception dialog box, click Get Certificate. Verify that all instances are up. Verify that all cluster resources are up across all three nodes.

Practices for Lesson 4

In these practices, you will contrast operating system, password file authenticated connections, and Oracle database authenticated connections. You will also learn to stop a complete ORACLE_HOME component stack

Practice 4-1: Operating System and Password File Authenticated Connections

In this practice, you will make both operating system authenticated connections and password file authenticated connections to the database instance. You will also examine problems with the oraenv script.

- 1) Connect to your first node as the oracle user and set up your environment variables using the oraenv script.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle
[oracle@host01 ~]$
```

- 2) Identify all the database instance names that are currently executing on your machine by using the Linux ps command. **Note:** All database instances have a mandatory background process named pmon, and the instance name will be part of the complete process name.

```
[oracle@host01 ~]$ ps -ef | grep -i pmon
oracle      7507 32418  0 10:48 pts/2    00:00:00 grep -i pmon
oracle      13488      1  0 08:51 ?        00:00:01 ora_pmon_orcl1
grid        23796      1  0 05:55 ?        00:00:03 asm_pmon_ASM1
```

- 3) Attempt to make a local connection to the orcl1 instance by using SQL*Plus with the sysdba privilege. This is known as operating system authentication because a password is not needed. What happens when trying to connect to the instance?

```
[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 10:49:28
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to an idle instance.

SQL> exit
Disconnected
[oracle@host01 ~]$
```

- 4) Attempt to connect to the instance using a network connection string @orcl with the sysdba privilege. This is known as password file authentication. Is the connection successful this time?

```
[oracle@host01 ~]$ sqlplus sys@orcl as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 10:50:12
2012
```

Practice 4-1: Operating System and Password File Authenticated Connections (continued)

```
Copyright (c) 1982, 2011, Oracle. All rights reserved.

Enter password:

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 -
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 ~]$
```

- 5) Display the values of the environment variables (ORACLE_BASE, ORACLE_HOME, ORACLE_SID, PATH, and LD_LIBRARY_PATH) that were defined with the oraenv script in step 1.

```
[oracle@host01 ~]$ env | grep ORA
ORACLE_SID=orcl
ORACLE_BASE=/u01/app/oracle
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1

[oracle@host01 ~]$ env | grep PATH
LD_LIBRARY_PATH=/u01/app/oracle/product/11.2.0/dbhome_1/lib
PATH=/usr/NX/bin:/usr/kerberos/bin:/usr/local/bin:/bin:/usr/bi
n:/u01/app/oracle/product/11.2.0/dbhome_1/bin:/bin
```

- 6) Modify the ORACLE_SID environment variable to match the actual database instance name for the orcl database.

```
[oracle@host01 ~]$ export ORACLE_SID=orcl1
```

- 7) Attempt the local connection with system authentication to the orcl1 instance by using SQL*Plus with the sysdba privilege. This is the same command as in step 3.

```
[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 10:55:32
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
```

Practice 4-1: Operating System and Password File Authenticated Connections (continued)

With the Partitioning, Real Application Clusters, Automatic Storage Management, OLAP, Data Mining and Real Application Testing options

SQL>

- 8) Query the instance_name column of the v\$instance dynamic performance view to validate the instance that you connected with. Exit SQL*Plus when finished.

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

```
INSTANCE_NAME
```

```
-----
```

```
orcl1
```

```
SQL> exit
```

Practice 4-2: Oracle Database Authenticated Connections

In this practice, you will make multiple Oracle database authenticated connections to a database instance and notice the effects of load balanced connections.

- 1) From your first node, connected as the oracle user, validate the instance names on each host.

```
[oracle@host01 ~]$ ps -ef | grep pmon
oracle      9103 32418   0 10:57 pts/2      00:00:00 grep pmon
oracle     13488     1   0 08:51 ?          00:00:01 ora_pmon_orcl1
grid       23796     1   0 05:55 ?          00:00:03 asm_pmon_ASM1

[oracle@host01 ~]$ ssh host02 ps -ef | grep pmon
oracle      965     1   0 08:52 ?          00:00:01 ora_pmon_orcl2
grid       20130     1   0 06:09 ?          00:00:03 asm_pmon_ASM2

[oracle@host01 ~]$ ssh host03 ps -ef | grep pmon
oracle     1907     1   0 08:52 ?          00:00:01 ora_pmon_orcl3
grid       19736     1   0 07:04 ?          00:00:02 asm_pmon_ASM3
```

- 2) Verify the current host name, and then set the environment variables using the oraenv script.

```
[oracle@host01 ~]$ hostname
host01.example.com
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [orcl1]? orcl
The Oracle base remains unchanged with value /u01/app/oracle
```

- 3) Connect to a database instance by using SQL*Plus with the system account. This is known as Oracle database authentication. After it is connected, query the instance_name column from the v\$instance dynamic performance view.
Note: Your instance names may vary from the ones displayed below.

```
[oracle@host01 ~]$ sqlplus system@orcl

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 11:00:15
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Enter password: oracle_4U << Password is not displayed

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> select instance_name from v$instance;

INSTANCE_NAME
```

Practice 4-2: Oracle Database Authenticated Connections (continued)

```
-----  
orcl1  
  
SQL>
```

- 4) Use the SQL*Plus host command to temporarily exit SQL*Plus and return to the operating system prompt. **Note:** SQL*Plus is still running when this is performed. Validate that you are still on your first node. Repeat step 3 from the operating system prompt to establish a second SQL*Plus session and database instance connection. What instance name did you connect to?

```
SQL> host  
$ hostname  
host01.example.com  
  
[oracle@host01 ~]$ sqlplus system@orcl  
  
SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 11:00:15  
2012  
  
Copyright (c) 1982, 2011, Oracle. All rights reserved.  
  
Enter password: oracle_4U << Password is not displayed  
  
Connected to:  
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0  
With the Partitioning, Real Application Clusters, Automatic  
Storage Management, OLAP,  
Data Mining and Real Application Testing options  
  
SQL> select instance_name from v$instance;  
  
INSTANCE_NAME  
-----  
orcl3  
  
SQL>
```

- 5) Use the SQL*Plus host command to temporarily exit SQL*Plus and return to the operating system prompt. **Note:** SQL*Plus is still running when this is performed. Validate that you are still on your first node. Repeat step 3 from the operating system prompt to establish a third SQL*Plus session and database instance connection. What instance name did you connect to?

```
SQL> host  
[oracle@host01 ~]$ hostname  
host01.example.com  
[oracle@host01 ~]$
```


Practice 4-2: Oracle Database Authenticated Connections (continued)

```
[oracle@host01 ~]$ sqlplus system@orcl

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 11:08:35
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Enter password: oracle_4U << Password is not displayed

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> select instance_name from v$instance;

INSTANCE_NAME
-----
orcl2

SQL>
```

- 6) Exit the three SQL*Plus sessions that are currently executing on the first node.

```
SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 ~]$ exit
exit

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 ~]$ exit
exit

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 ~]$
```

Practice 4-2: Oracle Database Authenticated Connections (continued)

```
$ exit << Optional. This will exit your terminal session.
```


Practice 4-3: Stopping a Complete ORACLE_HOME Component Stack (continued)

```
TARGET=ONLINE          , ONLINE          , ONLINE
STATE=ONLINE on host01, ONLINE on host02, ONLINE on host03
```

- 3) Display the syntax usage help for the `srvctl status home` command.

```
[oracle@host01 ~]$ srvctl status home -help

Displays the current state of all resources for the Oracle
home.

Usage: srvctl status home -o <oracle_home> -s <state_file> -n
<node_name>
    -o <oracle_home>          ORACLE_HOME path
    -s <state_file>          Specify a file path for the 'srvctl
status home' command to store the state of the resources
    -n <node_name>          Node name
    -h                      Print usage
```

- 4) Use the `srvctl status home` command to check the state of all resources running from the `/u01/app/oracle/product/11.2.0/dbhome_1` home location. Create the required state file in the `/tmp` directory with the file name `host01_dbhome_state.dmp` for the first node only.

```
[oracle@host01 ~]$ srvctl status home -o
/u01/app/oracle/product/11.2.0/dbhome_1 -s
/tmp/host01_dbhome_state.dmp -n host01
Database orcl is running on node host01
```

- 5) Display the syntax usage help for the `srvctl stop home` command.

```
[oracle@host01 ~]$ srvctl stop home -help

Stops all Oracle clusterware resources that run from the
Oracle home.

Usage: srvctl stop home -o <oracle_home> -s <state_file> -n
<node_name> [-t <stop_options>] [-f]
    -o <oracle_home>          ORACLE_HOME path
    -s <state_file>          Specify a file path for the 'srvctl stop
home' command to store the state of the resources
    -n <node_name>          Node name
    -t <stop_options>          Stop options for the database.
Examples of shutdown options are NORMAL, TRANSACTIONAL,
IMMEDIATE, or ABORT.
    -f                      Force stop
    -h                      Print usage
```

- 6) Stop all resources executing in the `/u01/app/oracle/product/11.2.0/dbhome_1`. Do not use the optional parameters identified by square brackets “[]” displayed in the syntax usage help.

Practice 4-3: Stopping a Complete ORACLE_HOME Component Stack (continued)

```
[oracle@host01 ~]$ srvctl stop home -o  
/u01/app/oracle/product/11.2.0/dbhome_1 -n host01 -s  
/tmp/host01_dbhome_state1.dmp  
[oracle@host01 ~]$
```

- 7) Check the status of the database instances on each node.

Note: There are several ways this step can be performed. Do not use the `srvctl status home` command with the same state file created above.

```
[oracle@host01 ~]$ srvctl status database -d orcl -v  
Instance orcl1 is not running on node host01  
Instance orcl2 is running on node host02. Instance status: Open.  
Instance orcl3 is running on node host03. Instance status: Open.
```

- 8) Start all resources for the `/u01/app/oracle/product/11.2.0/dbhome_1` home using the state file created by the stop command.

```
[oracle@host01 ~]$ srvctl start home -o  
/u01/app/oracle/product/11.2.0/dbhome_1 -s  
/tmp/host01_dbhome_state.dmp -n host01
```

- 9) Check the status of the database instances on each node.

Note: There are several ways this step can be performed.

```
[oracle@host01 ~]$ srvctl status database -d orcl -v  
Instance orcl1 is running on node host01. Instance status: Open.  
Instance orcl2 is running on node host02. Instance status: Open.  
Instance orcl3 is running on node host03. Instance status: Open.
```

Practices for Lesson 5

In this practice, you will configure ARCHIVELOG mode for your RAC database, configure instance-specific connect strings for RMAN, and configure persistent RMAN settings.

Practice 5-1: Configuring the Archive Log Mode

In this practice, you will configure the archive log mode of a Real Applications Cluster database.

- 1) From the first node of your cluster, open a terminal session as the `oracle` user and set up the environment variables using the `oraenv` script for the database instance. Change the value of the `ORACLE_SID` variable to allow local system authenticated connections.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle
[
oracle@host01 ~]$ export ORACLE_SID=orcl1
[oracle@host01 ~]$
```

- 2) Make a local connection using operating system authentication to the database instance, and then use the `archive log list` SQL command to determine whether the database is in archive log mode. Exit `SQL*Plus` when done.

```
[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 11:51:42
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> archive log list
Database log mode                No Archive Mode
Automatic archival                Disabled
Archive destination              USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence       2
Current log sequence             3

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 ~]$
```

- 3) Stop the `orcl` database on each node of the cluster by using the `srvctl stop database` command.

Practice 5-1: Configuring the Archive Log Mode (continued)

```
[oracle@host01 ~]$ srvctl stop database -d orcl
```

- 4) Verify that the orcl database is not running on any node of the cluster by using the `srvctl status database` command.

```
[oracle@host01 ~]$ srvctl status database -d orcl -v
Instance orcl1 is not running on node host01
Instance orcl2 is not running on node host02
Instance orcl3 is not running on node host03
```

- 5) Make a local connection using operating system authentication to the database instance, and then start up the database on only the first node with the mount option.

```
[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 11:54:42
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to an idle instance.

SQL> startup mount
ORACLE instance started.

Total System Global Area  910266368 bytes
Fixed Size                  2233680 bytes
Variable Size              629148336 bytes
Database Buffers           272629760 bytes
Redo Buffers                6254592 bytes
Database mounted.
SQL>
```

- 6) Issue the `alter database archivelog` SQL command to change the archive mode of the database, and then verify the results by using the `archive log list` SQL command.

```
SQL> alter database archivelog;

Database altered.

SQL> archive log list
Database log mode           Archive Mode
Automatic archival          Enabled
Archive destination         USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence  2
Next log sequence to archive 3
Current log sequence        3
```

- 7) Shut down the database instance with the immediate option and exit SQL*Plus. Use the `srvctl` utility to restart the database instances on all nodes of the cluster.

Practice 5-1: Configuring the Archive Log Mode (continued)

```
SQL> shutdown immediate
ORA-01109: database not open

Database dismounted.
ORACLE instance shut down.

SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

[oracle@host01 ~]$ srvctl start database -d orcl
[oracle@host01 ~]$
```

- 8) Verify that the orcl database is running on all the three nodes of your cluster by using the `srvctl status database` command.

```
[oracle@host01 ~]$ srvctl status database -d orcl -v
Instance orcl1 is running on node host01. Instance status: Open.
Instance orcl2 is running on node host02. Instance status: Open.
Instance orcl3 is running on node host03. Instance status: Open.
```

Practice 5-2: Configuring Specific Instance Connection Strings

In this practice, you will modify the `tnsnames.ora` file to disable connection load balancing and allow specific named instances to be used for connectivity.

- 1) Examine the `$ORACLE_HOME/network/admin/tnsnames.ora` file. There should be only one entry. This entry allows load balancing of connections.

```
[oracle@host01 ~]$ cat
/u01/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames
.ora
# tnsnames.ora Network Configuration File:
/u01/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames
.ora
# Generated by Oracle configuration tools.

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = cluster01-scan)(PORT =
1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
    )
  )
```

- 2) Execute the `/home/oracle/labs/less_05/fix_tns.sh` script. This script will add three additional entries to the `tnsnames.ora` file that disable load balancing of connections by requiring a specific `INSTANCE_NAME` when used. Examine the changes made to the `tnsnames.ora` file.

```
[oracle@host01 admin]$ cat
/u01/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames
.ora
# tnsnames.ora Network Configuration File:
/u01/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames
.ora
# Generated by Oracle configuration tools.

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = cluster01-scan)(PORT =
1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
    )
  )

# Added by lab 5
orcl1 =
  (DESCRIPTION =
    (ADDRESS_LIST =
```

Practice 5-2: Configuring Specific Instance Connection Strings (continued)

```
(ADDRESS = (PROTOCOL = TCP)(HOST = host01)(PORT=1521))
)
(CONNECT_DATA =
  (SERVICE_NAME = orcl)
  (INSTANCE_NAME = orcl1)
)
)
orcl2 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host02)(PORT=1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl2)
    )
  )
)
orcl3 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host03)(PORT=1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl3)
    )
  )
)
```

- 3) Using one of the three new entries in the `tnsnames.ora` file, connect to the system database account by using SQL*Plus, and verify the instance name to see that it matches the specific entry.

```
[oracle@host01~]$ sqlplus system@orcl2

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 14:04:15
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Enter password: oracle_4U << Password is not displayed

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> select instance_name from v$instance;

INSTANCE_NAME
```

Practice 5-2: Configuring Specific Instance Connection Strings (continued)

```
-----  
orcl2  
  
SQL>
```

- 4) Use the SQL*Plus host command to temporarily exit SQL*Plus and return to the operating system prompt. **Note:** SQL*Plus is still running when this is performed. Repeat step 3 from the operating system prompt to establish a second SQL*Plus session and database instance connection using the same connection string. Verify that the INSTANCE_NAME stays the same.

```
SQL> host  
[oracle@host01~]$ sqlplus system@orcl2  
  
SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 14:04:15  
2012  
  
Copyright (c) 1982, 2011, Oracle. All rights reserved.  
  
Enter password: oracle_4U << Password is not displayed  
  
Connected to:  
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0  
With the Partitioning, Real Application Clusters, Automatic  
Storage Management, OLAP,  
Data Mining and Real Application Testing options  
  
SQL> select instance_name from v$instance;  
  
INSTANCE_NAME  
-----  
orcl2
```

- 5) Exit both SQL*Plus sessions.

```
SQL> exit  
Disconnected from Oracle Database 11g Enterprise Edition  
Release 11.2.0.3.0  
With the Partitioning, Real Application Clusters, Automatic  
Storage Management, OLAP,  
Data Mining and Real Application Testing options  
  
[oracle@host01 ~]$ exit  
  
SQL> exit  
Disconnected from Oracle Database 11g Enterprise Edition  
Release 11.2.0.3.0  
With the Partitioning, Real Application Clusters, Automatic  
Storage Management, OLAP,  
Data Mining and Real Application Testing options
```

Practice 5-2: Configuring Specific Instance Connection Strings (continued)

```
[oracle@host01 ~]$
```

Practice 5-3: Configuring RMAN and Performing Parallel Backups

In this practice, you will designate your first and second nodes of the cluster as nodes responsible for performing parallel backups of the database. The database will be backed up to the +FRA ASM disk group by default.

- 1) Using the recovery manager utility (RMAN), connect to the `orcl` database as the target database.

```
[oracle@host01 ~]$ rman target /

Recovery Manager: Release 11.2.0.3.0 - Production on Tue May 8
14:20:45 2012

Copyright (c) 1982, 2011, Oracle and/or its affiliates. All
rights reserved.

connected to target database: ORCL (DBID=1310509726)

RMAN>
```

- 2) Display all of the current RMAN settings.

```
RMAN> show all
2> ;

using target database control file instead of recovery catalog
RMAN configuration parameters for database with db_unique_name
ORCL are:
CONFIGURE RETENTION POLICY TO REDUNDANCY 1; # default
CONFIGURE BACKUP OPTIMIZATION OFF; # default
CONFIGURE DEFAULT DEVICE TYPE TO DISK; # default
CONFIGURE CONTROLFILE AUTOBACKUP OFF; # default
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK
TO '%F'; # default
CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO
BACKUPSET; # default
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1; #
default
CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE DISK TO 1;
# default
CONFIGURE MAXSETSIZE TO UNLIMITED; # default
CONFIGURE ENCRYPTION FOR DATABASE OFF; # default
CONFIGURE ENCRYPTION ALGORITHM 'AES128'; # default
CONFIGURE COMPRESSION ALGORITHM 'BASIC' AS OF RELEASE
'DEFAULT' OPTIMIZE FOR LOAD TRUE ; # default
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # default
CONFIGURE SNAPSHOT CONTROLFILE NAME TO
'/u01/app/oracle/product/11.2.0/dbhome_1/dbs/snapcf_orcl1.f';
# default
```

Practice 5-3: Configuring RMAN and Performing Parallel Backups (continued)

- 3) Configure RMAN to automatically back up the control file and server parameter file each time any backup operation is performed.

```
RMAN> configure controlfile autobackup on;

new RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP ON;
new RMAN configuration parameters are successfully stored
```

- 4) Configure all backups done to disk to be done in parallel 2 degrees of parallelism.

```
RMAN> configure device type disk parallelism 2;

new RMAN configuration parameters:
CONFIGURE DEVICE TYPE DISK PARALLELISM 2 BACKUP TYPE TO
BACKUPSET;
new RMAN configuration parameters are successfully stored
```

- 5) Configure channel 1 and channel 2 to use the connect string 'sys/oracle_4U@orcl#' when performing a parallel backup to disk. Replace the pound sign (#) with 1 for channel 1 and 2 for channel 2, respectively. This will designate your first and second nodes as dedicated backup nodes for the cluster using the node specific connection strings created earlier. Without node specific connection strings, there would be no control over which nodes are being connected to in order to perform the backups.

```
RMAN> configure channel 1 device type disk
connect='sys/oracle_4U@orcl1';

new RMAN configuration parameters:
CONFIGURE CHANNEL 1 DEVICE TYPE DISK CONNECT '*';
new RMAN configuration parameters are successfully stored

RMAN> configure channel 2 device type disk
connect='sys/oracle_4U@orcl2';

new RMAN configuration parameters:
CONFIGURE CHANNEL 2 DEVICE TYPE DISK CONNECT '*';
new RMAN configuration parameters are successfully stored
RMAN>
```

- 6) Open a second terminal session as the oracle account and set up the environment variables for the orcl database. Navigate to the ~/labs/less_05 directory, invoke SQL*plus as the system user, and run the monitor_rman.sql script. Do not exit the first session with the RMAN prompt or this second session with the SQL prompt.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle
```

Practice 5-3: Configuring RMAN and Performing Parallel Backups (continued)

```
[oracle@host01 ~]$ cd /home/oracle/labs/less_05

[oracle@host01 less_05]$ sqlplus system@orcl

SQL*Plus: Release 11.2.0.3.0 Production on Tue May 8 14:27:40
2012

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Enter password: oracle_4U << Password is not displayed

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options

SQL> @monitor_rman.sql

no rows selected
```

- 7) In the first session with the RMAN prompt, perform a full database backup with archive logs. The backup should happen only on the designated nodes (your first and second nodes) as the backup nodes. **Do not wait for this step to finish before proceeding to the next step!**

```
RMAN> backup database plus archivelog;

Starting backup at 08-MAY-12
current log archived
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=51 instance=orcl1 device type=DISK
allocated channel: ORA_DISK_2
channel ORA_DISK_2: SID=65 instance=orcl1 device type=DISK
channel ORA_DISK_1: starting archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=3 RECID=2 STAMP=782740866
input archived log thread=3 sequence=1 RECID=3 STAMP=782741334
input archived log thread=2 sequence=1 RECID=1 STAMP=782740737
channel ORA_DISK_1: starting piece 1 at 08-MAY-12
channel ORA_DISK_2: starting archived log backup set
channel ORA_DISK_2: specifying archived log(s) in backup set
input archived log thread=1 sequence=4 RECID=5 STAMP=782741347
input archived log thread=3 sequence=2 RECID=4 STAMP=782741345
input archived log thread=3 sequence=3 RECID=6 STAMP=782741348
input archived log thread=1 sequence=5 RECID=9 STAMP=782749743
input archived log thread=3 sequence=4 RECID=8 STAMP=782749742
channel ORA_DISK_2: starting piece 1 at 08-MAY-12
channel ORA_DISK_1: finished piece 1 at 08-MAY-12
```


Practice 5-3: Configuring RMAN and Performing Parallel Backups (continued)

```
piece
handle=+FRA/orcl/backupset/2012_05_08/annnf0_tag20120508t14290
7_0.272.782749751 tag=TAG20120508T142907 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time:
00:00:09
channel ORA_DISK_1: starting archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=2 sequence=2 RECID=7 STAMP=782749741
channel ORA_DISK_1: starting piece 1 at 08-MAY-12
channel ORA_DISK_2: finished piece 1 at 08-MAY-12
piece
handle=+FRA/orcl/backupset/2012_05_08/annnf0_tag20120508t14290
7_0.273.782749753 tag=TAG20120508T142907 comment=NONE
channel ORA_DISK_2: backup set complete, elapsed time:
00:00:08
channel ORA_DISK_1: finished piece 1 at 08-MAY-12
piece
handle=+FRA/orcl/backupset/2012_05_08/annnf0_tag20120508t14290
7_0.274.782749759 tag=TAG20120508T142907 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time:
00:00:01
Finished backup at 08-MAY-12

Starting backup at 08-MAY-12
using channel ORA_DISK_1
using channel ORA_DISK_2
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001
name=+DATA/orcl/datafile/system.256.782728867
input datafile file number=00004
name=+DATA/orcl/datafile/users.259.782728869
input datafile file number=00005
name=+DATA/orcl/datafile/example.264.782729043
channel ORA_DISK_1: starting piece 1 at 08-MAY-12
channel ORA_DISK_2: starting full datafile backup set
channel ORA_DISK_2: specifying datafile(s) in backup set
input datafile file number=00002
name=+DATA/orcl/datafile/sysaux.257.782728869
input datafile file number=00003
name=+DATA/orcl/datafile/undotbs1.258.782728869
input datafile file number=00006
name=+DATA/orcl/datafile/undotbs2.265.782729293
input datafile file number=00007
name=+DATA/orcl/datafile/undotbs3.266.782729301
channel ORA_DISK_2: starting piece 1 at 08-MAY-12
channel ORA_DISK_1: finished piece 1 at 08-MAY-12
```

Practice 5-3: Configuring RMAN and Performing Parallel Backups (continued)

```
piece
handle=+FRA/orcl/backupset/2012_05_08/nnndf0_tag20120508t14292
1_0.275.782749763 tag=TAG20120508T142921 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time:
00:01:56
channel ORA_DISK_2: finished piece 1 at 08-MAY-12
piece
handle=+FRA/orcl/backupset/2012_05_08/nnndf0_tag20120508t14292
1_0.276.782749767 tag=TAG20120508T142921 comment=NONE
channel ORA_DISK_2: backup set complete, elapsed time:
00:01:56
Finished backup at 08-MAY-12

Starting backup at 08-MAY-12
current log archived
using channel ORA_DISK_1
using channel ORA_DISK_2
channel ORA_DISK_1: starting archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=2 sequence=3 RECID=12
STAMP=782749881
input archived log thread=1 sequence=6 RECID=11
STAMP=782749881
channel ORA_DISK_1: starting piece 1 at 08-MAY-12
channel ORA_DISK_2: starting archived log backup set
channel ORA_DISK_2: specifying archived log(s) in backup set
input archived log thread=3 sequence=5 RECID=10
STAMP=782749881
channel ORA_DISK_2: starting piece 1 at 08-MAY-12
channel ORA_DISK_1: finished piece 1 at 08-MAY-12
piece
handle=+FRA/orcl/backupset/2012_05_08/annnf0_tag20120508t14312
5_0.280.782749887 tag=TAG20120508T143125 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time:
00:00:01
channel ORA_DISK_2: finished piece 1 at 08-MAY-12
piece
handle=+FRA/orcl/backupset/2012_05_08/annnf0_tag20120508t14312
5_0.281.782749887 tag=TAG20120508T143125 comment=NONE
channel ORA_DISK_2: backup set complete, elapsed time:
00:00:01
Finished backup at 08-MAY-12

Starting Control File and SPFILE Autobackup at 08-MAY-12
piece
handle=+FRA/orcl/autobackup/2012_05_08/s_782749888.282.7827498
93 comment=NONE
Finished Control File and SPFILE Autobackup at 08-MAY-12
```

Practice 5-3: Configuring RMAN and Performing Parallel Backups (continued)

```
RMAN>
```

- 8) While the backup is in progress, rerun the query on the second terminal window to monitor the RMAN backup session progress within the cluster. The backup should be done in parallel, with work distributed to both the backup nodes of the cluster. Enter the slash (/) symbol and press the Enter key to rerun the query. It may be necessary to do this multiple times until the output appears.

```
SQL> /

no rows selected

SQL> /

no rows selected
SQL> /

INST_ID      SID      SERIAL#      CONTEXT      SOFAR      TOTALWORK      %_COMPLETE
-----      -
          1          51          297           1        18812         131600         14.29
          1          65          123           1           0          86400           0

SQL> /

INST_ID      SID      SERIAL#      CONTEXT      SOFAR      TOTALWORK      %_COMPLETE
-----      -
          1          51          297           1        72188         131600         54.85
          1          65          123           1       29694          86400         34.37

SQL> exit
```

- 9) Run the /home/oracle/labs/less_05/cleanup_13.sh script.

```
[oracle@host01 ~]$ /home/oracle/labs/less_05/cleanup_05.sh
The Oracle base for
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is
/u01/app/oracle
```

- 10) Exit all windows when finished.

Practices for Lesson 7

This practice is designed to show you how to discover performance problems in your RAC environment. In this practice, you identify performance issues by using Enterprise Manager, and fix issues in three different steps. At each step, you will generate the same workload to make sure that you are making progress in your resolution.

Practice 7-1: ADDM and RAC Part I

The goal of this practice is to show you how to manually discover performance issues by using the Enterprise Manager performance pages as well as ADDM. This first part generates a workload that uses a bad RAC application design.

Note that all the necessary scripts for this practice are located in the /home/oracle/labs/less_07 directory on your first cluster node.

- 1) Before you start this practice, make sure that you have the necessary TNS entries in the `tnsnames.ora` file located in your `ORACLE_HOME` for the `orcl` database. You can execute the following script to create those entries:
`add_tnsinstances.sh`.

```
[oracle@host01 ~]$ cd /home/oracle/labs/less_07
[oracle@host01 less_07]$ ./add_tnsinstances.sh
# tnsnames.ora Network Configuration File:
/u01/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames.ora
# Generated by Oracle configuration tools.

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = cluster01-scan)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
    )
  )

orcl1 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host01)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl1)
    )
  )

orcl2 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host02)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl2)
    )
  )
```

Practice 7-1: ADDM and RAC Part I (continued)

```
orcl3 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host03)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl3)
    )
  )
[oracle@host01 less_07]$
```

- 2) Execute the `setupseq1.sh` script to set up the necessary configuration for this practice.

```
[oracle@host01 less_07]$ ./setupseq1.sh

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

drop user jmw cascade
*
ERROR at line 1:
ORA-01918: user 'JMW' does not exist

drop tablespace seq including contents and datafiles
*
ERROR at line 1:
ORA-00959: tablespace 'SEQ' does not exist

Tablespace created.

User created.

Grant succeeded.

drop sequence s
*
ERROR at line 1:
ORA-02289: sequence does not exist

drop table s purge
*
```

Practice 7-1: ADDM and RAC Part I (continued)

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

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

Table created.

Table created.

Index created.

1 row created.

Commit complete.

PL/SQL procedure successfully completed.

[oracle@host01 less_07]$
```

- 3) Using Database Control, and connected as the SYS user, navigate to the Performance page of your Cluster Database.
 - 1) Click the Performance tab from the Cluster Database Home page.
 - 2) On the Cluster Database Performance page, make sure that Real Time: 15 Seconds Refresh is selected from the View Data drop-down list.
- 4) Use PL/SQL to create a new AWR snapshot.

```
[oracle@host01 less_07]$ ./create_snapshot.sh

PL/SQL procedure successfully completed.

[oracle@host01 less_07]$
```

- 5) Execute the startseq1.sh script to generate a workload on all instances of your cluster. Do not wait; proceed with the next step.

```
[oracle@host01 less_07]$ ./startseq1.sh
```

Practice 7-1: ADDM and RAC Part I (continued)

```
[oracle@host01 less_07]$ old 7: insert into t
values(v, '&1');
new 7: insert into t values(v, 'orcl2');
old 7: insert into t values(v, '&1');
new 7: insert into t values(v, 'orcl1');
old 7: insert into t values(v, '&1');
new 7: insert into t values(v, 'orcl3');

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

[oracle@host01 less_07]$
```

- 6) Using Database Control, determine the list of blocking locks in your database.
 - 1) Still on the Performance page, click the Database Locks link in the Additional Monitoring Links section of the page.
 - 2) On the Database Locks page, make sure that Blocking Locks is selected from the View drop-down list.
 - 3) If you do not see any locks, refresh the page by clicking Refresh. Perform this until you see locks. When you see a session lock, you should also see that the other session is waiting for that same lock. By clicking Refresh several times, you must see that all sessions are alternatively waiting for the other to release the exclusive lock held on table S.
- 7) While the scripts are still executing, look at the Average Active Sessions graphic. Then, drill down to the Cluster wait class for the first node. What are your conclusions?
 - 1) By using the drill-down method of Enterprise Manager, you can quickly identify the top waiting SQL statements and the top waiting sessions on both instances. Here it appears that an UPDATE statement on table S is causing most of the waits for the Cluster wait class.
 - 2) Click Cluster Database in the locator link at the top of the page to return to the Cluster Database Performance page.
 - 3) From there you can now see the Average Active Sessions graph. Make sure that the View Data field is set to Real Time:15 Seconds Refresh. After a few seconds, the graphic must clearly show that the Cluster and Application wait classes are causing most waits. Using the Throughput tabbed page graph underneath the Average Active Sessions graph, you should also notice that the transaction rate is about 160 per second.

Practice 7-1: ADDM and RAC Part I (continued)

- 4) In the Average Active Sessions graph, click the Cluster link on the right. This takes you to the Active Sessions By Instance: Cluster page.
- 5) On the Active Sessions By Instance: Cluster page, you will see that the number of active sessions is almost the same on all nodes. Click the first instance's link (instance number 1). This takes you to the Active Sessions Waiting: Cluster page for the corresponding instance.
- 6) On the Active Sessions Waiting: Cluster page, you can see the most important wait events causing most of the waits in the Cluster wait class on the first instance. In the Top SQL: Cluster section, click the SQL identifier that uses most of the resources. This takes you to the SQL Details page for the corresponding statement. You will see that the script running on the first instance is executing a SELECT/UPDATE statement on table S that causes most of the Cluster waits.
- 8) Using Database Control, look at the Cluster Cache Coherency page. What are your conclusions?
 - 1) On the Cluster Database Home page, click the Performance tab.
 - 2) On the Performance page, click the Cluster Cache Coherency link in the Additional Monitoring Links section.
 - 3) The Cluster Cache Coherency page clearly shows that there are lots of blocks transferred per second on the system. This represents more than 17% of the total logical reads. This is reflected in both the Global Cache Block Transfer Rate and the Global Cache Block Transfers and Physical Reads (vs. Logical Reads) graphics.
 - 4) On the Cluster Cache Coherency page, you can also click Interconnects in the Additional Links section of the page to get more information about your private interconnect.
- 9) While the scripts are still executing, look at the Average Active Sessions graph on the Database Performance page. Then drill down to the Application wait class for the first instance. What are your conclusions?
 - 1) By using the drill-down method of Enterprise Manager, you can quickly identify the top waiting SQL statements and the top waiting sessions on both instances. Here it appears that a LOCK statement on table S is causing most of the waits for the Application wait class.
 - 2) Go back to the Cluster Database Home page by clicking the Database tab located in the top right-end corner. On the Cluster Database Home page, click the Performance tab.
 - 3) On the Performance page, make sure that the View Data field is set to Real Time: 15 Seconds Refresh. After a few seconds, the graphic should clearly show that the Cluster and Application wait classes are causing most waits. You will also notice that the transaction rate is about 100 per second.
 - 4) In the Average Active Sessions graph, click the Application link on the right. This takes you to the Active Sessions By Instance: Application page.

Practice 7-1: ADDM and RAC Part I (continued)

- 5) On the Active Sessions By Instance: Application page, you must see that the number of active sessions is almost the same on all nodes. Click the link for the first instance (number 1) on the Summary Chart graph. This takes you to the Active Sessions Waiting: Application page of the first instance.
 - 6) On the Active Sessions Waiting: Application page, you can see the most important wait events causing most of the waits in the Application wait class on the first instance. In the Top SQL: Application section, click the SQL identifier that uses most of the resources. This takes you to the SQL Details page for the corresponding statement. You must see that the script running on the first instance is executing a LOCK statement on table S that causes most of the Application waits.
 - 7) After a while, you can see that all scripts are executed by looking at the Average Active Sessions graph as well as the Database Throughput graphics again. You should see the number of transactions per second going down.
- 10) After the workload finishes, use PL/SQL to create a new AWR snapshot.

```
[oracle@host01 less_07]$ ./create_snapshot.sh

PL/SQL procedure successfully completed.

[oracle@host01 less_07]$
```

- 11) Using Database Control, review the latest ADDM run. What are your conclusions?
- 1) On the Cluster Database Home page, click the Advisor Central link in the Related Links section.
 - 2) On the Advisor Central page, make sure that the Advisory Type field is set to All Types, and that the Advisor Runs field is set to Last Run. Click Go.
 - 3) In the Results table, select the latest ADDM run corresponding to Instance All. Then click View Result. This takes you to the Automatic Database Diagnostic Monitor (ADDM) page.
 - 4) On the Automatic Database Diagnostic Monitor (ADDM) page, the ADDM Performance Analysis table shows you the consolidation of ADDM reports from all instances running in your cluster. This is your first entry point before drilling down to specific instances. From there, investigate the Top SQL Statements, Table Locks, and Global Cache Messaging findings.
 - 5) Click the Top SQL Statements finding, which affects all instances, revealing LOCK TABLE S and UPDATE S commands as a possible problem to investigate. Click the Back button to return to the ADDM report.
 - 6) Click the Table Locks finding, which affects all instances, revealing that you should investigate your application logic regarding the JMW.S object.
 - 7) Click the Global Cache Messaging finding revealing again the UPDATE S command as responsible for approximately 30% of Cluster waits during the analysis period.

Practice 7-1: ADDM and RAC Part I (continued)

- 8) Back to the Automatic Database Diagnostic Monitor (ADDM) page, you now have the possibility to drill down to each instance using the links located in the Affected Instances table. Click the link corresponding to the most affected instance (although all should be equally affected).
- 9) On the corresponding ADDM Database Diagnostic Monitor (ADDM) instance page, you should retrieve similar top findings you previously saw at the cluster level.

Practice 7-2: ADDM and RAC Part II

The goal of this practice is to show you how to manually discover performance issues by using the Enterprise Manager performance pages as well as ADDM. In this second part of the practice, you are going to correct the previously found issue by creating a sequence number instead of by using a table.

Note that all the necessary scripts for this practice are located in the /home/oracle/labs/less_07 directory on your first cluster node.

- 1) Execute the `setupseq2.sh` script to create the necessary objects used for the rest of this practice.

```
[oracle@host01 less_07]$ ./setupseq2.sh

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

User dropped.

Tablespace dropped.

Tablespace created.

User created.

Grant succeeded.

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

drop sequence s
*
ERROR at line 1:
ORA-02289: sequence does not exist

drop table t purge
*
ERROR at line 1:
ORA-00942: table or view does not exist
```

Practice 7-2: ADDM and RAC Part II (continued)

```
Table created.
```

```
Index created.
```

```
Sequence created.
```

```
PL/SQL procedure successfully completed.
```

```
[oracle@host01 less_07]$
```

- 2) Using Database Control, and connected as the SYS user, navigate to the Performance page of your Cluster Database.
 - 1) Click the Performance tab from the Cluster Database Home page.
 - 2) On the Cluster Database Performance page, make sure Real Time: 15 Seconds Refresh is selected from the View Data drop-down list.
- 3) Use PL/SQL to create a new AWR snapshot.

```
[oracle@host01 less_07]$ ./create_snapshot.sh
```

```
PL/SQL procedure successfully completed.
```

```
[oracle@host01 less_07]$
```

- 4) Execute the startseq2.sh script to generate a workload on all instances of your cluster. Do not wait; proceed with the next step.

```
[oracle@host01 less_07]$ ./startseq2.sh
[oracle@host01 less_07]$ old 3: insert into t
values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl2');
old 3: insert into t values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl3');
old 3: insert into t values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl1');
```

... **Do not wait after this point and go to the next step.**

```
PL/SQL procedure successfully completed.
```

```
PL/SQL procedure successfully completed.
```

```
PL/SQL procedure successfully completed
```

```
[oracle@host01 less_07]$ $
```

Practice 7-2: ADDM and RAC Part II (continued)

- 5) While the scripts are still executing, look at the Average Active Sessions graphic. Then drill down to the Cluster wait class for the first node. What are your conclusions?
 - 1) By using the drill-down method of Enterprise Manager, you can quickly identify the top waiting SQL statements and the top waiting sessions on both instances. Here it appears that an INSERT statement on table T is causing most of the waits for the Cluster wait class.
 - 2) Click Cluster Database in the locator link at the top of the page to return to the Cluster Database Performance page.
 - 3) From there you can now see the Average Active Sessions graph. Make sure that the View Data field is set to Real Time:15 Seconds Refresh. After a few seconds, the graphic will clearly show that the Cluster and Application wait classes are causing most waits. Using the Throughput tabbed page graph underneath the Average Active Sessions graph, you should also notice that the transaction rate is about 250 per second (a better rate than in the previous practice).
 - 4) In the Average Active Sessions graph, click the Cluster link on the right. This takes you to the Active Sessions By Instance: Cluster page.
 - 5) On the Active Sessions By Instance: Cluster page, you must see that the number of active sessions is almost the same on all nodes. Click the first instance's link (instance number 1). This takes you to the Active Sessions Waiting: Cluster page for the corresponding instance.
 - 6) On the Active Sessions Waiting: Cluster page, you can see the most important wait events causing most of the waits in the Cluster wait class on the first instance. In the Top SQL: Cluster section, click the SQL identifier that uses most of the resources. This takes you to the SQL Details page for the corresponding statement. You will see that the script running on the first instance is executing an INSERT statement on table T that causes most of the Cluster waits.
 - 7) After a while you can see that all are executed by looking at the Average Active Sessions graphic again. The Database Throughput graphic tells you that this time, the number of transactions per second was a bit higher than in the previous practice for the same workload. Using the sequence number was a bit better in this case.
- 6) After the workload finishes, use PL/SQL to create a new AWR snapshot.

```
[oracle@host01 less_07]$ ./create_snapshot.sh  
  
PL/SQL procedure successfully completed.  
  
[oracle@host01 less_07]$
```
- 7) Using Database Control, review the latest ADDM run. What are your conclusions?
 - 1) On the Cluster Database Home page, click the Advisor Central link.

Practice 7-2: ADDM and RAC Part II (continued)

- 2) On the Advisor Central page, make sure that the Advisory Type field is set to All Types, and that the Advisor Runs field is set to Last Run. Click Go.
- 3) In the Results table, select the latest ADDM run corresponding to Instance All. Then click View Result. This takes you to the Automatic Database Diagnostic Monitor (ADDM) page.
- 4) On the Automatic Database Diagnostic Monitor (ADDM) page, the ADDM Performance Analysis table shows you the consolidation of ADDM reports from all instances running in your cluster. This is your first entry point before drilling down to specific instances. From there, investigate the Top SQL Statements, Sequence Usage, and Unusual “Concurrency” Wait Event findings.
- 5) The Top SQL Statements should reveal an INSERT INTO T command using sequence S as a possible problem to investigate.
- 6) The Sequence Usage finding reveals that you should use larger cache size for your hot sequences.
- 7) The Unusual “Concurrency” Wait Event finding asks you to investigate the cause for high “row cache lock” waits. Refer to the *Oracle Database Reference* for the description of this wait event.
- 8) Back to the Automatic Database Diagnostic Monitor (ADDM) page, you now have the possibility to drill down to each instance using the links located in the Affected Instances table. Click the link corresponding to the most affected instance (although all should be equally affected).
- 8) On the corresponding ADDM Database Diagnostic Monitor (ADDM) instance page, you should retrieve top findings similar to those you previously saw at the cluster level.

Practice 7-3: ADDM and RAC Part III

The goal of this practice is to show you how to manually discover performance issues by using the Enterprise Manager performance pages as well as ADDM. This last part generates the same workload as in the previous practice, but uses more cache entries for sequence number S.

Note that all the necessary scripts for this practice are located in the /home/oracle/labs/less_07 directory on your first cluster node.

- 1) Execute the `setupseq3.sh` script to create the necessary objects used for the rest of this practice.

```
[oracle@host01 less_07]$ ./setupseq3.sh

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

User dropped.

Tablespace dropped.

Tablespace created.

User created.

Grant succeeded.

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

drop sequence s
      *
ERROR at line 1:
ORA-02289: sequence does not exist

drop table t purge
      *
ERROR at line 1:
ORA-00942: table or view does not exist
```


Practice 7-3: ADDM and RAC Part III (continued)

```
Table created.
```

```
Index created.
```

```
Sequence created.
```

```
PL/SQL procedure successfully completed.
```

```
[oracle@host01 less_07]$
```

- 2) Using Database Control, and connected as the SYS user, navigate to the Performance page of your Cluster Database.
 - 1) Click the Performance tab from the Cluster Database Home page.
 - 2) On the Cluster Database Performance page, make sure that Real Time: 15 Seconds Refresh is selected from the View Data drop-down list.
- 3) Use PL/SQL to create a new AWR snapshot.

```
[oracle@host01 less_07]$ ./create_snapshot.sh
```

```
PL/SQL procedure successfully completed.
```

```
[oracle@host01 less_07]$
```

- 4) Execute the startseq2.sh script to generate the same workload on both instances of your cluster as for the previous practice. Do not wait, and proceed with the next step.

```
[oracle@host01 less_07]$ ./startseq2.sh
[oracle@host01 less_07]$ old 3: insert into t
values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl3');
old 3: insert into t values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl2');
old 3: insert into t values(s.nextval, '&1');
new 3: insert into t values(s.nextval, 'orcl1');
```

... **Do not wait after this point and go to the next step.**

```
PL/SQL procedure successfully completed.
```

```
PL/SQL procedure successfully completed.
```

Practice 7-3: ADDM and RAC Part III (continued)

```
PL/SQL procedure successfully completed.  
[oracle@host01 less_07]$
```

- 5) Until the scripts are executed, look at the Average Active Sessions graphic. What are your conclusions?
- 1) This time, looking at the Average Active Sessions graphic, it is clear that there are no significant waits. The sequence has a big enough cache value to avoid the most significant waits.
 - 2) Click Cluster Database in the locator link at the top of the page to return to the Cluster Database Performance page.
 - 3) On the Performance page, make sure that the View Data field is set to Real Time:15 Seconds Refresh. After all the scripts have finished their execution, the Average Active Sessions graph will clearly show that there are no significant waits on your cluster. You must also notice that the transaction rate is now around 1500 per second.
- 6) After the workload finishes, use PL/SQL to create a new AWR snapshot.

```
$ ./create_snapshot.sh  
  
PL/SQL procedure successfully completed.  
  
$
```

- 7) Using Database Control, review the latest ADDM run. What are your conclusions?
- 1) On the Cluster Database Home page, click the Advisor Central link.
 - 2) On the Advisor Central page, make sure that the Advisory Type field is set to All Types, and that the Advisor Runs field is set to Last Run. Click Go.
 - 3) In the Results table, select the latest ADDM run corresponding to Instance All. Then click View Result. This takes you to the Automatic Database Diagnostic Monitor (ADDM) page.
 - 4) On the Automatic Database Diagnostic Monitor (ADDM) page, the ADDM Performance Analysis table shows you the consolidation of ADDM reports from all instances running in your cluster. This is your first entry point before drilling down to specific instances. From there, investigate the Buffer Busy – Hot Block, Buffer Busy – Hot Objects, and Global Cache Busy findings. You should no longer see the Sequence Usage, nor specific instances impacted.
 - 5) The Buffer Busy – Hot Block finding should not reveal any particular object.
 - 6) The Buffer Busy – Hot Objects finding should not reveal any particular object.
 - 7) The Global Cache Busy finding should not reveal anything special.

Practices for Lesson 8

In these practices, you will create, manage, and monitor services.

Practice 8-1: Working with Services

In this practice, you will use Enterprise Manager to create one service called PROD1. You then observe what happens to your service when you terminate one of the instances on which it is running.

- 1) Use Enterprise Manager to create the PROD1 service. Make sure that you define your first and second instances (ORCL1 and ORCL2) as preferred, and the third instance (ORCL3) as available.

- 1) Enter your EM address in a browser.

<https://host01.example.com:1158/em>

- 2) Log in using SYS credentials as SYSDBA.
 - 3) Click the Availability tab.
 - 4) Click the Cluster Managed Database Services link under the Services section.
 - 5) On the Cluster Managed Database Services: Cluster and Database Login page, provide the login credentials for the operating system user (oracle/oracle) and the SYSDBA credentials for the database (sys/oracle_4U) and click Continue.
 - 6) Click the Create Service button on the Cluster Managed Database Services page.
 - 7) On the Create Service page, enter PROD1 for the service name. Verify that the “Start service after creation” check box is selected, and select the “Update local naming” check box. Under the High Availability Configuration section, set the service policy for orcl1 and orcl2 to Preferred and ORCL3 to Available. Leave the remaining fields with their default values and click the OK button.
 - 8) After the service has been created, you will be returned to the Cluster Managed Database Services page. Check the Running Instances column for PROD1, it should indicate the service running on orcl1 and orcl2. Select PROD1 from the Services list and click the Test Connection button. It should test successfully. Click the Show All TNS Strings button and inspect the new entry to the tnsnames.ora file. It should look like this:

```
PROD1 = (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)
(HOST = cluster01-scan) (PORT = 1521))(LOAD_BALANCE =
YES)(CONNECT_DATA = (SERVER = DEDICATED)(SERVICE_NAME =
PROD1)))
```

- 9) Click the Return button.

- 2) Use the `srvctl` command to check the status of the new service.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$ srvctl status service -d ORCL -s PROD1
Service PROD1 is running on instance(s) orcl1,orcl2
```

Practice 8-1: Working with Services (continued)

```
[oracle@host01 ~]$
```

- 3) Use the `crsctl` command to view server pool relationships with the new service.

```
[oracle@host01 ~]$ /u01/app/11.2.0/grid/bin/crsctl status
serverpool -p
NAME=Free
IMPORTANCE=0
MIN_SIZE=0
MAX_SIZE=-1
SERVER_NAMES=
PARENT_POOLS=
EXCLUSIVE_POOLS=
ACL=owner:grid:rw,pgroup:oinstall:rw,other::r-x

NAME=Generic
IMPORTANCE=0
MIN_SIZE=0
MAX_SIZE=-1
SERVER_NAMES=host01 host02 host03
PARENT_POOLS=
EXCLUSIVE_POOLS=
ACL=owner:grid:r-x,pgroup:oinstall:r-x,other::r-x

NAME=ora.orcl
IMPORTANCE=1
MIN_SIZE=0
MAX_SIZE=-1
SERVER_NAMES=host01 host02 host03
PARENT_POOLS=Generic
EXCLUSIVE_POOLS=
ACL=owner:oracle:rw,pgroup:oinstall:rw,other::r--

NAME=ora.orcl_PROD1
IMPORTANCE=0
MIN_SIZE=0
MAX_SIZE=-1
SERVER_NAMES=host01 host02 host03
PARENT_POOLS=ora.orcl
EXCLUSIVE_POOLS=
ACL=owner:oracle:rw,pgroup:oinstall:rw,other::r--

[oracle@host01 ~]$
```

- 4) Connect to the service and look at the current value of the `SERVICE_NAMES` initialization parameter, and verify that it is set correctly. Query `V$INSTANCE` and determine what instance you are connected to.

```
[oracle@host01 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/bin/sqlplus
sys/oracle_4U@PROD1 as sysdba
```

Practice 8-1: Working with Services (continued)

```
SQL*Plus: Release 11.2.0.3.0 Production on Wed May 9 08:55:42
2012
```

```
Copyright (c) 1982, 2011, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
```

```
SQL> show parameter service
```

NAME	TYPE	VALUE
service_names	string	PROD1

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

```
INSTANCE_NAME
```

```
-----
orcl2
```

```
SQL> exit
```

```
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.2.0.3.0
With the Partitioning, Real Application Clusters, Automatic
Storage Management, OLAP,
Data Mining and Real Application Testing options
[oracle@host01 less_07]$
```

- 5) From a terminal session as the oracle user, crash the instance on the first node. Find and kill the ora_pmon_orcl process. Use the `kill -9 -f pmon_orcl1` command to crash the database instance. The orcl1 instance will crash and the Clusterware services will restart it very quickly

```
[oracle@host01 ~]$ kill -9 -f pmon_orcl1
```

- 6) Use the `srvctl` command to check the status of the PROD1 service. (It may take a few moments to show up on the orcl3)

```
[oracle@host01 ~]$ srvctl status service -d ORCL -s PROD1
Service PROD1 is running on instance(s) orcl2,orcl3
```

```
[oracle@host01 ~]$
```

Practice 8-1: Working with Services (continued)

- 7) Return to Enterprise Manager. Click the Availability folder tab. In the instance list under the Instances section, you should be able to verify that the first instance is indeed down.
- 8) Click the Cluster Managed Database Services link. On the Cluster Managed Database Service page, you can see `orcl2` and `orcl3` in the running instances column for `PROD1`. Select Manage from the Actions drop-down list and click Go.
- 9) Under the instances section, find the host that `orcl3` is running on and select the option in the Select column for that host. Click the Relocate button.
- 10) On the Relocate Service from Instance: `orcl03` page, select the host name that `orcl1` is running on and click OK.
- 11) You should see a message indicating that the service was relocated successfully. Under the Instances section of the page, you should see the service running on `orcl1` and `orcl2` and stopped on `orcl3`.

Note: The instance status shown in EM may still show that the instance is down. Click the browser Refresh button to see the actual status of the instance.

Practice 8-2: Monitoring Services

In this practice, you will use Database Control to determine the amount of resources used by sessions executing under a particular service.

- 1) As the oracle user, open a terminal session to your first node. Execute the /home/oracle/labs/less_08/createuser.sh script. This script creates a new user called JMW identified by the password jmw. The default tablespace of this user is USERS, and its temporary tablespace is TEMP. This new user has the CONNECT, RESOURCE, and DBA roles.

```
[oracle@host01 ~]$ cat /home/oracle/labs/less_08/createuser.sh

export ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1
export ORACLE_SID=orcl1
/u01/app/oracle/product/11.2.0/dbhome_1/bin/sqlplus -s /NOLOG
<<EOF

connect / as sysdba
drop user JMW cascade;
create user JMW identified by jmw default tablespace users
temporary tablespace temp;
grant connect, resource, dba to JMW;

EOF

[oracle@host01 ~]$ /home/oracle/labs/less_08/createuser.sh
drop user JMW cascade
*
ERROR at line 1:
ORA-01918: user 'JMW' does not exist

User created.

Grant succeeded.

[oracle@host01 ~]$
```

- 2) Using SQL*Plus, connect to PROD1 as JMW. When connected, determine the instance on which your session is currently running. Then execute the following query:
select count(*) from dba_objects,dba_objects,dba_objects
Do not wait; instead, proceed with the next step.

```
$ sqlplus jmw/jmw@PROD1
SQL> select instance_name from v$instance;

INSTANCE_NAME
-----
```


Practice 8-2: Monitoring Services (continued)

```
orcl1
```

```
SQL> select count(*) from dba_objects,dba_objects,dba_objects;
```

- 3) After a few moments, go to the Database Control Top Consumers page from the Cluster Database page. Connect as user SYS. Then check that PROD1 is using more and more resources.
 - a. From the Cluster Database Home page, click the Performance tab.
 - b. On the Performance page, click the Top Consumers link in the Additional Monitoring Links section.
 - c. This takes you to the Top Consumers page with the Overview tab selected.
 - d. On the Overview page, you can see the Top Services pie chart.
 - e. Make sure that the View Data drop-down list is set to Real Time: 15 Second Refresh. Wait for the page to be refreshed a couple of times. Little by little, PROD1 is consuming almost all the resources (up to 100%).
 - f. To have more details, click the Top Services tab on the Top Consumers page.
 - g. Make sure that the View Data drop-down list is set to Real Time: 15 Second Refresh, and View drop-down list is set to Active Services. You can click the “+” icon on the left of the PROD1 link to expand the service. This shows you the list of instances currently running the service. You can also click the PROD1 link itself to look at the detailed Statistics of the corresponding service.
- 4) In another terminal window as the oracle user, check statistics on your service with `gv$sqlservice_stats` from a SQL*Plus session connected as SYSDBA.

```
[oracle@host01 ~]$
```

```
/u01/app/oracle/product/11.2.0/dbhome_1/bin/sqlplus  
sys/oracle_4U@orcl as sysdba
```

```
SQL*Plus: Release 11.2.0.3.0 Production on Wed May 9 09:14:54  
2012
```

```
Copyright (c) 1982, 2011, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0  
Production
```

```
With the Partitioning, Real Application Clusters, Automatic  
Storage Management, OLAP,  
Data Mining and Real Application Testing options
```

```
SQL> select stat_name, sum(value) from gv$sqlservice_stats where  
service_name = 'PROD1' group by stat_name;
```

STAT_NAME	SUM(VALUE)
user calls	43

Practice 8-2: Monitoring Services (continued)

DB CPU	1368469523
redo size	1564
db block changes	8
DB time	1473281835
user rollbacks	0
gc cr blocks received	2
gc cr block receive time	0
gc current blocks received	2
opened cursors cumulative	99
workarea executions - multipass	0
STAT_NAME	SUM(VALUE)
-----	-----
session cursor cache hits	45
user I/O wait time	3540
parse count (total)	71
physical reads	4
gc current block receive time	0
workarea executions - optimal	22
concurrency wait time	17361
parse time elapsed	110704
physical writes	0
workarea executions - onepass	0
execute count	96
STAT_NAME	SUM(VALUE)
-----	-----
session logical reads	3825
cluster wait time	2161
application wait time	20622
logons cumulative	2
sql execute elapsed time	1473090354
user commits	0
28 rows selected.	
SQL>	

Note: If the DBA_OBJECTS query executed in step 2 has not finished at the end of this practice, enter <Ctl>-C in that terminal window to terminate the query. If your instance crashes, Clusterware will restart it

Practice 8-3: Services and Alert Thresholds

In this practice, you will set thresholds for service PROD1, and use Database Control to monitor the response time metric for this service. In this practice, you will set the Elapsed Time in seconds warning threshold at 4 and the critical threshold at 1. Preferred instances should be orcl1 and orcl2, and orcl3 should be available.

- 1) Set alert thresholds for your service PROD1 by using Database Control.
 - 1) Log in as `sys` with SYSDBA privileges.
 - 2) On the Database Home page, click the Availability folder tab. Then click the Cluster Managed Database Services link. On the Cluster Managed Database Services: Cluster and Database Login page, provide the login credentials for the operating system user (`oracle/oracle`) and the SYSDBA credentials for the database (`sys/oracle_4U`) and click Continue.
 - 3) Select PROD1 from the Services list, select Edit Properties from the Actions drop-down list and click Go.
 - 4) Under the High Availability Configuration section, set the Service Policy for orcl1 to Preferred and Available for orcl2 and orcl3. Then click OK.
 - 5) Return to the Cluster Database home page, click the link corresponding to your first instance in the Instances table. This is the instance currently running PROD1.
 - 6) On the Database Instance page, click Metric and Policy settings in the Related Links section at the bottom of the page.
 - 7) On the Metric and Policy Settings page, select All metrics from the View drop-down list.
 - 8) Scroll down the Metric and Policy Settings page until you find the Service Response Time (per user call) (microseconds) metric.
 - 9) On the same line, click the corresponding multi-pens icon in the last column (Edit column).
 - 10) On the Edit Advanced Settings: Service Response Time (per user call) (microseconds) page, click Add.
 - 11) The Monitored Objects table should now show two entries.
 - 12) Enter PROD1 in the Service Name field, 40000000 in the Warning Threshold field, and 100000000 in the Critical Threshold field. Make sure that the corresponding line is selected, and click Continue.
 - 13) On the Metric and Policy Settings page, you should see an Information warning explaining that your settings have been modified but not saved. Click OK to save the new settings.
 - 14) On the Confirmation page, you can see an Update succeeded message. Click OK.
 - 15) This takes you back to the Database Instance page.

- 2) Use Database Control to view the Service Response Time Metric Value graphic for PROD1.
 - 1) From the Database Instance page, click All Metrics in the Related Links section at the bottom of the page.
 - 2) On the All Metrics page, expand the Database Services link. On the All Metrics page, click the Service Response Time (per user call) (microseconds) link.
 - 3) On the Service Response Time (per user call) (microseconds) page, click the PROD1 link in the Service Name column.
 - 4) On the Service Response Time (per user call) (microseconds): Service Name PROD1: Last 24 hours page, select Real Time: 30 Second Refresh from the View Data drop-down list.
 - 5) You should now see the Service Response Time (per user call) (microseconds): Service Name PROD1 page with your warning and critical thresholds set correctly.
- 3) Execute the `serv_wkload.sh` script to generate workload on your database. Looking at the Service Response time graphic for PROD1, what do you observe?

```
$ cd /home/oracle/labs/less_08
$ ./serv_wkload.sh
```

- 1) Still looking at the Service Response Time (per user call) (microseconds): Service Name PROD1 page on your first session, you should see the graphic crossing the warning threshold after few minutes. This will trigger a warning alert soon after the warning threshold is crossed.
- 2) You can see this alert propagated to your Database Instance Home page, and Cluster Database Home page.
- 3) To go back to your Database Instance Home page, click the Database Instance locator link on the Service Response Time page.
- 4) You should see the warning raised in the Alerts section of the Database Instance page.
- 5) On the Database Instance page, click the Cluster Database locator link of the page.
- 6) You should see the warning alert in the Problem Services line in the High Availability section of the page. Clicking this link takes you to the Cluster Home page. From there you can click the PROD1 link to directly go to the Cluster Managed Database Services: PROD1 page after you clicked Continue on the Login page. The PROD1 page shows you the alert with its details.
- 7) Soon after the script finishes its execution, you should not see the corresponding alert on your Cluster Database Home page anymore. You can go to the Alert History page on the first instance to look at the alert history for your services. You can go to the Database Instance Home page using the locator links at the top of any pages. From the Database Instance Home page, scroll down to the bottom of the page, and click Alert History in the Related Links section.

- 4) Use Database Control to remove the thresholds that you specified during this practice.
 - 1) From the Cluster Database Home page, click the link corresponding to the first instance of your cluster in the Instances section at the bottom of the page.
 - 2) On the Database Instance page, scroll down to the bottom of the page. Click Metric and Policy Settings in the Related Links section.
 - 3) On the Metric and Policy Settings page, scroll down the page until you see PROD1 in the Metric Thresholds table.
 - 4) On the line corresponding to the PROD1 entry, remove both the Warning Threshold and Critical Threshold values.
 - 5) Click OK.
 - 6) On the Confirmation page, you should see an Update succeeded message. Click OK.

Practices for Lesson 10

In this practice, you will install a Patch Set Update for your Oracle RAC 11.2.0.3 installation.

Practice 10-1: Applying a PSU to the Cluster ORACLE_HOMEs

The goal of this practice is to apply a Patch Set Update to your cluster.

In this practice, you will apply OPatch patch p6880880_112000_LINUX.zip. This will upgrade OPatch to its latest release. This patch should be applied to any Oracle or Grid Home from which OPatch will be run from.

After OPatch has been upgraded, you will apply Grid Infrastructure Patch Set Update 11.2.0.3.2 (which includes Database PSU 11.2.0.3.2) to the nodes in your cluster. These patches are located in the /share directory, which is NFS mounted on all three of your cluster nodes.

- 1) The latest version of OPatch must be installed in each *Grid_Home* to be patched. The OPatch patch p6880880_112000_LINUX.zip is located in /share. As the grid user, unzip the patch to /u01/app/11.2.0/grid on hosts host01, host02, and host03.

```
[grid@host01 ~]$ cd /share
[grid@host01 ~]$ ls -la
-rw-r--r-- 1 root root 32510817 Apr 26 12:18
p6880880_112000_Linux-x86-64.zip

[grid@host01 share]$ unzip p6880880_112000_LINUX.zip -d
/u01/app/11.2.0/grid
Archive:  p6880880_112000_LINUX.zip
  creating: /u01/app/11.2.0/grid/OPatch/oplan/
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.html
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.txt
  creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/oplan.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/oracle.oplan.classpath.
jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/automation.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/OsysModel.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/EMrepoDrivers.jar
  creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/commons-cli-1.0.jar
  creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/activation.jar
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-
api.jar
```

```

inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-impl.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jsr173_1.0_api.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/osysmodel-utils.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/CRSProductDriver.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/oplan
replace /u01/app/11.2.0/grid/OPatch/docs/FAQ? [y]es, [n]o, [A]ll, [N]one, [r]ename: A
inflating: /u01/app/11.2.0/grid/OPatch/docs/FAQ
inflating: /u01/app/11.2.0/grid/OPatch/docs/Users_Guide.txt
inflating:
/u01/app/11.2.0/grid/OPatch/docs/Prereq_Users_Guide.txt
inflating: /u01/app/11.2.0/grid/OPatch/jlib/opatch.jar
inflating: /u01/app/11.2.0/grid/OPatch/jlib/opatchsdk.jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.unix.jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.windows.jar
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/opatch_prereq.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/rulemap.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/runtime_prereq.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/oui/knowledgesrc.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/prerequisite.properties
inflating: /u01/app/11.2.0/grid/OPatch/opatch
inflating: /u01/app/11.2.0/grid/OPatch/opatch.bat
inflating: /u01/app/11.2.0/grid/OPatch/opatch.pl
inflating: /u01/app/11.2.0/grid/OPatch/opatch.ini
inflating: /u01/app/11.2.0/grid/OPatch/opatchdiag
inflating: /u01/app/11.2.0/grid/OPatch/opatchdiag.bat
inflating: /u01/app/11.2.0/grid/OPatch/emdpatch.pl
inflating: /u01/app/11.2.0/grid/OPatch/README.txt
creating: /u01/app/11.2.0/grid/OPatch/ocm/bin/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/bin/emocmrsp
creating: /u01/app/11.2.0/grid/OPatch/ocm/doc/
creating: /u01/app/11.2.0/grid/OPatch/ocm/lib/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcInt-14.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcInt.jar

```



```

inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcommon.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/http_client.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jcert.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jnet.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jsse.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/log4j-
core.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_core3.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_jce.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/regexp.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/xmlparserv2.jar
extracting: /u01/app/11.2.0/grid/OPatch/ocm/ocm.zip
inflating: /u01/app/11.2.0/grid/OPatch/ocm/ocm_platforms.txt
creating: /u01/app/11.2.0/grid/OPatch/crs/
creating: /u01/app/11.2.0/grid/OPatch/crs/log/
extracting: /u01/app/11.2.0/grid/OPatch/crs/log/dummy
inflating: /u01/app/11.2.0/grid/OPatch/crs/auto_patch.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsconfig_lib.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsdelete.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crspatch.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/installPatch.excl
inflating: /u01/app/11.2.0/grid/OPatch/crs/oracss.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/patch112.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_defs
inflating:
/u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_lib.pm

[grid@host01 share]$ ssh host02
Last login: Thu Apr 26 12:28:13 2012 from host01.example.com

[grid@host02 ~]$ cd /share

[grid@host02 share]$ unzip p6880880_112000_LINUX.zip -d
/u01/app/11.2.0/grid
Archive:  p6880880_112000_LINUX.zip
  creating: /u01/app/11.2.0/grid/OPatch/oplan/
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.html
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.txt
  creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/
  inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/oplan.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/oracle.oplan.classpath.
jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/automation.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/OsysModel.jar
  inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/EMrepoDrivers.jar

```

```

    creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/
    inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/commons-cli-1.0.jar
    creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/
    inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/activation.jar
    inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-
api.jar
    inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-
impl.jar
    inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jsr173_1.0_api.jar
    inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/osysmodel-
utils.jar
    inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/CRSProductDriver.jar
    inflating: /u01/app/11.2.0/grid/OPatch/oplan/oplan
replace /u01/app/11.2.0/grid/OPatch/docs/FAQ? [yles, [nlo,
[A]ll, [N]one, [r]ename: A
    inflating: /u01/app/11.2.0/grid/OPatch/docs/FAQ
    inflating: /u01/app/11.2.0/grid/OPatch/docs/Users_Guide.txt
    inflating:
/u01/app/11.2.0/grid/OPatch/docs/Prereq_Users_Guide.txt
    inflating: /u01/app/11.2.0/grid/OPatch/jlib/opatch.jar
    inflating: /u01/app/11.2.0/grid/OPatch/jlib/patchsdk.jar
    inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.jar
    inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.unix.
jar
    inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.windo
ws.jar
    inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/opatch_prereq
.xml
    inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/rulemap.xml
    inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/runtime_prere
q.xml
    inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/oui/knownedgesrc.xml
    inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/prerequisite.propert
ies
    inflating: /u01/app/11.2.0/grid/OPatch/opatch
    inflating: /u01/app/11.2.0/grid/OPatch/opatch.bat
    inflating: /u01/app/11.2.0/grid/OPatch/opatch.pl
    inflating: /u01/app/11.2.0/grid/OPatch/opatch.ini
    inflating: /u01/app/11.2.0/grid/OPatch/opatchdiag
    inflating: /u01/app/11.2.0/grid/OPatch/opatchdiag.bat

```

```

inflating: /u01/app/11.2.0/grid/OPatch/emdpatch.pl
inflating: /u01/app/11.2.0/grid/OPatch/README.txt
creating: /u01/app/11.2.0/grid/OPatch/ocm/bin/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/bin/emocmrsp
creating: /u01/app/11.2.0/grid/OPatch/ocm/doc/
creating: /u01/app/11.2.0/grid/OPatch/ocm/lib/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcInt-
14.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcInt.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcommon.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/http_client.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jcert.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jnet.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jsse.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/log4j-
core.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_core3.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_jce.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/regexp.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/xmlparserv2.jar
extracting: /u01/app/11.2.0/grid/OPatch/ocm/ocm.zip
inflating: /u01/app/11.2.0/grid/OPatch/ocm/ocm_platforms.txt
creating: /u01/app/11.2.0/grid/OPatch/crs/
creating: /u01/app/11.2.0/grid/OPatch/crs/log/
extracting: /u01/app/11.2.0/grid/OPatch/crs/log/dummy
inflating: /u01/app/11.2.0/grid/OPatch/crs/auto_patch.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsconfig_lib.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsdelete.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crspatch.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/installPatch.excl
inflating: /u01/app/11.2.0/grid/OPatch/crs/oracss.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/patch112.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_defs
inflating:
/u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_lib.pm

[grid@host02 share]$ ssh host03
Last login: Thu Apr 26 12:28:13 2012 from host01.example.com

[grid@host03 ~]$ cd /share

[grid@host03 share]$ unzip p6880880_112000_LINUX.zip -d
/u01/app/11.2.0/grid
Archive:  p6880880_112000_LINUX.zip
creating: /u01/app/11.2.0/grid/OPatch/oplan/
inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.html
inflating: /u01/app/11.2.0/grid/OPatch/oplan/README.txt
creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/oplan.jar

```

```

inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/oracle.oplan.classpath.
jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/automation.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/OsysModel.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/EMrepoDrivers.jar
creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/apache-
commons/commons-cli-1.0.jar
creating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/activation.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-
api.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jaxb-
impl.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/jaxb/jsr173_1.0_api.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/jlib/osysmodel-
utils.jar
inflating:
/u01/app/11.2.0/grid/OPatch/oplan/jlib/CRSPProductDriver.jar
inflating: /u01/app/11.2.0/grid/OPatch/oplan/oplan
replace /u01/app/11.2.0/grid/OPatch/docs/FAQ? [y]es, [n]o,
[A]ll, [N]one, [r]ename: A
inflating: /u01/app/11.2.0/grid/OPatch/docs/FAQ
inflating: /u01/app/11.2.0/grid/OPatch/docs/Users_Guide.txt
inflating:
/u01/app/11.2.0/grid/OPatch/docs/Prereq_Users_Guide.txt
inflating: /u01/app/11.2.0/grid/OPatch/jlib/opatch.jar
inflating: /u01/app/11.2.0/grid/OPatch/jlib/opatchsdk.jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.unix.
jar
inflating:
/u01/app/11.2.0/grid/OPatch/jlib/oracle.opatch.classpath.windo
ws.jar
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/opatch_prereq
.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/rulemap.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/opatch/runtime_prere
q.xml
inflating:
/u01/app/11.2.0/grid/OPatch/opatchprereqs/oui/knowledgesrc.xml

```

```

inflating:
/u01/app/11.2.0/grid/OPatch/patchprereqs/prerequisite.properties
inflating: /u01/app/11.2.0/grid/OPatch/patch
inflating: /u01/app/11.2.0/grid/OPatch/patch.bat
inflating: /u01/app/11.2.0/grid/OPatch/patch.pl
inflating: /u01/app/11.2.0/grid/OPatch/patch.ini
inflating: /u01/app/11.2.0/grid/OPatch/patchdiag
inflating: /u01/app/11.2.0/grid/OPatch/patchdiag.bat
inflating: /u01/app/11.2.0/grid/OPatch/emdpatch.pl
inflating: /u01/app/11.2.0/grid/OPatch/README.txt
creating: /u01/app/11.2.0/grid/OPatch/ocm/bin/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/bin/emocmrsp
creating: /u01/app/11.2.0/grid/OPatch/ocm/doc/
creating: /u01/app/11.2.0/grid/OPatch/ocm/lib/
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmclnt-
14.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/emocmclnt.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/emocmcommon.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/http_client.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jcert.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jnet.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/jsse.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/log4j-
core.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_core3.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/osdt_jce.jar
inflating: /u01/app/11.2.0/grid/OPatch/ocm/lib/regexp.jar
inflating:
/u01/app/11.2.0/grid/OPatch/ocm/lib/xmlparserv2.jar
extracting: /u01/app/11.2.0/grid/OPatch/ocm/ocm.zip
inflating: /u01/app/11.2.0/grid/OPatch/ocm/ocm_platforms.txt
creating: /u01/app/11.2.0/grid/OPatch/crs/
creating: /u01/app/11.2.0/grid/OPatch/crs/log/
extracting: /u01/app/11.2.0/grid/OPatch/crs/log/dummy
inflating: /u01/app/11.2.0/grid/OPatch/crs/auto_patch.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsconfig_lib.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crsdelete.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/crspatch.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/installPatch.excl
inflating: /u01/app/11.2.0/grid/OPatch/crs/oracss.pm
inflating: /u01/app/11.2.0/grid/OPatch/crs/patch112.pl
inflating: /u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_defs
inflating:
/u01/app/11.2.0/grid/OPatch/crs/s_crsconfig_lib.pm

[grid@host03 share]$ exit
Connection to host03 closed.

[grid@host02 share]$ exit

```

```
Connection to host02 closed.
```

```
[grid@host01 share]
```

- 2) Next, apply the OPatch patch to all of the database homes as the oracle user. The OPatch patch p6880880_112000_Linux-x86-64.zip is located in /share. As the oracle user, unzip the patch to /u01/app/oracle/product/11.2.0/dbhome_1 on hosts host01, host02, and host03.

```
[oracle@host01 ~]$ cd /share
[oracle@host01 share]$ ls -la
total 31948
drwxrwxr-x  5 root root          4096 May  9 05:50 .
drwxr-xr-x 30 root root          4096 May  8 12:04 ..
drwxr-xr-x  4 grid oinstall       4096 Apr  5 14:23 13696216
drwxrwxr-x  5 grid oinstall       4096 Apr  5 14:23 13696251
-rw-r--r--  1 grid oinstall        422 Apr  5 14:23 bundle.xml
drwx----- 2 root root        16384 Apr 26 05:59 lost+found
-rw-r--r--  1 root root       32510817 Apr 26 12:18
p6880880_112000_Linux-x86-64.zip
-rw-rw-r--  1 grid oinstall    109547 Apr 17 16:08 README.html
-rw-r--r--  1 grid oinstall        21 Apr  5 14:23 README.txt
...
[oracle@host01 share]$ unzip p6880880_112000_LINUX.zip -d
/u01/app/oracle/product/11.2.0/dbhome_1

Archive:  /share/p6880880_112000_LINUX.zip
  creating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.html
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.txt
    creating:
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/jlib/
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/jlib/oplan.jar/
...

*** On host02 ***

[oracle@host01 share]$ ssh host02 unzip
/share/p6880880_112000_LINUX.zip -d
/u01/app/oracle/product/11.2.0/dbhome_1

Archive:  /share/p6880880_112000_LINUX.zip
  creating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.html
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.txt
    creating:
  inflating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/jlib/
```

```
...

*** On host03 ***

[oracle@host03 share]$ ssh host03 unzip
/share/p6880880_112000_LINUX.zip -d
/u01/app/oracle/product/11.2.0/dbhome_1

Archive:  /share/p6880880_112000_LINUX.zip
  creating: /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/
  inflating:
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.html
  inflating:
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/README.txt
  creating:
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/oplan/jlib/
...

[oracle@host01 share]$
```

- 3) The OPatch utility will prompt for your OCM (Oracle Configuration Manager) response file when it is run. Because this file has not yet been created, you will need to execute the emocmrsp command as the oracle user on each node. Do not provide an email address. Because emocmrsp command creates the response file in the current directory, navigate to /u01/app/oracle/product/11.2.0/dbhome_1/OPatch/OPatch/ocm before executing.

```
[oracle@host01 ~]$ id
uid=54321(oracle) gid=54321(oinstall)
groups=503(oper),505(asmdba),54321(oinstall),54322(dba)

[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$ cd
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm

[oracle@host01 ocm]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/bin/emocmrsp

OCM Installation Response Generator 10.3.4.0.0 - Production
Copyright (c) 2005, 2010, Oracle and/or its affiliates. All
rights reserved.

Provide your email address to be informed of security issues,
install and
initiate Oracle Configuration Manager. Easier for you if you
use your My
Oracle Support Email address/User Name.
Visit http://www.oracle.com/support/policies.html for details.
```

Email address/User Name: <<< **No email address** >>>

You have not provided an email address for notification of security issues.

Do you wish to remain uninformed of security issues ([Y]es, [N]o) [N]: **Y**

The OCM configuration response file (ocm.rsp) was successfully created.

***** On host02 *****

oracle@host01 ~]\$ **ssh host02**

[oracle@host02 ~]\$ **. oraenv**

ORACLE_SID = [oracle] ? orcl

The Oracle base has been set to /u01/app/oracle

[oracle@host02 ~]\$ **cd**

/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm

[oracle@host02 ocm]\$

/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/bin/emocmrsp

OCM Installation Response Generator 10.3.4.0.0 - Production
Copyright (c) 2005, 2010, Oracle and/or its affiliates. All rights reserved.

Provide your email address to be informed of security issues, install and initiate Oracle Configuration Manager. Easier for you if you use your My

Oracle Support Email address/User Name.

Visit <http://www.oracle.com/support/policies.html> for details.

Email address/User Name: <<< **No email address** >>>

You have not provided an email address for notification of security issues.

Do you wish to remain uninformed of security issues ([Y]es, [N]o) [N]: **Y**

The OCM configuration response file (ocm.rsp) was successfully created.

***** On host03 *****

[oracle@host02 ~]\$ **ssh host03**

[oracle@host03 ~]\$ **. oraenv**

ORACLE_SID = [oracle] ? orcl

The Oracle base has been set to /u01/app/oracle

[oracle@host03 ~]\$ **cd**

/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm


```
[oracle@host03 ocm]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/bin/emocmrsp

OCM Installation Response Generator 10.3.4.0.0 - Production
Copyright (c) 2005, 2010, Oracle and/or its affiliates. All
rights reserved.

Provide your email address to be informed of security issues,
install and
initiate Oracle Configuration Manager. Easier for you if you
use your My
Oracle Support Email address/User Name.
Visit http://www.oracle.com/support/policies.html for details.
Email address/User Name: <<< No email address >>>

You have not provided an email address for notification of
security issues.
Do you wish to remain uninformed of security issues ([Y]es,
[N]o) [N]: Y
The OCM configuration response file (ocm.rsp) was successfully
created.
[oracle@host03 ~]$ exit
[oracle@host02 ~]$ exit
[oracle@host01 ~]$
```

- 4) Before beginning patch application, check the consistency of inventory information for each Oracle home to be patched. Run the following command as the oracle user to check the consistency.

```
[oracle@host01 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/patch
lsinventory -detail -oh
/u01/app/oracle/product/11.2.0/dbhome_1

Oracle Interim Patch Installer version 11.2.0.3.0
Copyright (c) 2012, Oracle Corporation. All rights reserved.

Oracle Home          : /u01/app/oracle/product/11.2.0/dbhome_1
Central Inventory     : /u01/app/oraInventory
   from               :
/u01/app/oracle/product/11.2.0/dbhome_1/oraInst.loc
OPatch version        : 11.2.0.3.0
OUI version           : 11.2.0.3.0
Log file location     :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/patch/opa
tch2012-05-09_10-46-30AM_1.log

Lsinventory Output file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/patch/lsi
nv/lsinventory2012-05-09_10-46-30AM.txt

-----
```

Installed Top-level Products (1):

Oracle Database 11g

11.2.0.3.0

There are 1 products installed in this Oracle Home.

Installed Products (136):

Agent Required Support Files

10.2.0.4.3

Assistant Common Files

11.2.0.3.0

Bali Share

1.1.18.0.0

Buildtools Common Files

11.2.0.3.0

Character Set Migration Utility

11.2.0.3.0

Cluster Verification Utility Common Files

11.2.0.3.0

Database Configuration and Upgrade Assistants

11.2.0.3.0

Database SQL Scripts

11.2.0.3.0

Database Workspace Manager

11.2.0.3.0

Deinstallation Tool

11.2.0.3.0

Enterprise Edition Options

11.2.0.3.0

Enterprise Manager Agent

10.2.0.4.3

Enterprise Manager Agent Core Files

10.2.0.4.4

Enterprise Manager Common Core Files

10.2.0.4.4

Enterprise Manager Common Files

10.2.0.4.3

Enterprise Manager Database Plugin -- Agent Support

11.2.0.3.0

Enterprise Manager Database Plugin -- Repository Support

11.2.0.3.0

Enterprise Manager Grid Control Core Files

10.2.0.4.4

Enterprise Manager plugin Common Files

11.2.0.3.0

Enterprise Manager Repository Core Files

10.2.0.4.4

Exadata Storage Server

11.2.0.1.0

...

There are 136 products installed in this Oracle Home.

There are no Interim patches installed in this Oracle Home.

Rac system comprising of multiple nodes

Local node = host01
Remote node = host02
Remote node = host03

OPatch succeeded.

```
[oracle@host01 ~]$ ssh host02
[oracle@host02 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/opatch
lsinventory -detail -oh
/u01/app/oracle/product/11.2.0/dbhome_1
```

Oracle Interim Patch Installer version 11.2.0.3.0
Copyright (c) 2012, Oracle Corporation. All rights reserved.

Oracle Home : /u01/app/oracle/product/11.2.0/dbhome_1
Central Inventory : /u01/app/oraInventory
from :
/u01/app/oracle/product/11.2.0/dbhome_1/oraInst.loc
OPatch version : 11.2.0.3.0
OUI version : 11.2.0.3.0
Log file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/opa
tch2012-05-09_10-46-32AM_1.log

Lsinventory Output file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/lsi
nv/lsinventory2012-05-09_10-46-32AM.txt

Installed Top-level Products (1):

Oracle Database 11g
11.2.0.3.0
There are 1 products installed in this Oracle Home.

Installed Products (136):

Agent Required Support Files
10.2.0.4.3
Assistant Common Files
11.2.0.3.0
Bali Share
1.1.18.0.0

```
Buildtools Common Files
11.2.0.3.0
Character Set Migration Utility
11.2.0.3.0
Cluster Verification Utility Common Files
11.2.0.3.0
Database Configuration and Upgrade Assistants
11.2.0.3.0
Database SQL Scripts
11.2.0.3.0
Database Workspace Manager
11.2.0.3.0
Deinstallation Tool
11.2.0.3.0
Enterprise Edition Options
11.2.0.3.0
Enterprise Manager Agent
10.2.0.4.3
Enterprise Manager Agent Core Files
10.2.0.4.4
Enterprise Manager Common Core Files
10.2.0.4.4
Enterprise Manager Common Files
10.2.0.4.3
Enterprise Manager Database Plugin -- Agent Support
11.2.0.3.0
Enterprise Manager Database Plugin -- Repository Support
11.2.0.3.0
Enterprise Manager Grid Control Core Files
10.2.0.4.4
Enterprise Manager plugin Common Files
11.2.0.3.0
Enterprise Manager Repository Core Files
10.2.0.4.4
Exadata Storage Server
11.2.0.1.0
...
There are 136 products installed in this Oracle Home.

There are no Interim patches installed in this Oracle Home.

Rac system comprising of multiple nodes
  Local node = host02
  Remote node = host01
  Remote node = host03

-----

OPatch succeeded.
```

```
[oracle@host02 ~]$ ssh host03
[oracle@host03 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/opatch
lsinventory -detail -oh
/u01/app/oracle/product/11.2.0/dbhome_1

Oracle Interim Patch Installer version 11.2.0.3.0
Copyright (c) 2012, Oracle Corporation. All rights reserved.

Oracle Home      : /u01/app/oracle/product/11.2.0/dbhome_1
Central Inventory : /u01/app/oraInventory
   from           :
/u01/app/oracle/product/11.2.0/dbhome_1/oraInst.loc
OPatch version   : 11.2.0.3.0
OUI version      : 11.2.0.3.0
Log file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/opa
tch2012-05-09_10-46-42AM_1.log

Lsinventory Output file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/lsi
nv/lsinventory2012-05-09_10-46-43AM.txt

-----
Installed Top-level Products (1):

Oracle Database 11g
11.2.0.3.0
There are 1 products installed in this Oracle Home.

Installed Products (136):

Agent Required Support Files
10.2.0.4.3
Assistant Common Files
11.2.0.3.0
Bali Share
1.1.18.0.0
Buildtools Common Files
11.2.0.3.0
Character Set Migration Utility
11.2.0.3.0
Cluster Verification Utility Common Files
11.2.0.3.0
Database Configuration and Upgrade Assistants
11.2.0.3.0
Database SQL Scripts
11.2.0.3.0
Database Workspace Manager
11.2.0.3.0
```

```

Deinstallation Tool
11.2.0.3.0
Enterprise Edition Options
11.2.0.3.0
Enterprise Manager Agent
10.2.0.4.3
Enterprise Manager Agent Core Files
10.2.0.4.4
Enterprise Manager Common Core Files
10.2.0.4.4
Enterprise Manager Common Files
10.2.0.4.3
Enterprise Manager Database Plugin -- Agent Support
11.2.0.3.0
Enterprise Manager Database Plugin -- Repository Support
11.2.0.3.0
Enterprise Manager Grid Control Core Files
10.2.0.4.4
Enterprise Manager plugin Common Files
11.2.0.3.0
Enterprise Manager Repository Core Files
10.2.0.4.4
Exadata Storage Server
11.2.0.1.0
...
There are 136 products installed in this Oracle Home.

There are no Interim patches installed in this Oracle Home.

Rac system comprising of multiple nodes
  Local node = host03
  Remote node = host01
  Remote node = host02

-----
OPatch succeeded.

[oracle@host03 ~]$ exit
[oracle@host02 ~]$ exit
[oracle@host01 ~]$

```

- 5) You must stop the EM agent processes running from the database home, prior to patching the Oracle RAC database or Grid Home. Set the oracle environment for the oracle user, export the ORACLE_UNQNAME variable, and execute the emctl stop dbconsole command on the first node.

```

[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$ export ORACLE_UNQNAME=orcl

```

```
[oracle@host01 ~]$ emctl stop dbconsole
Oracle Enterprise Manager 11g Database Control Release
11.2.0.3.0
Copyright (c) 1996, 2011 Oracle Corporation. All rights
reserved.
https://host01.example.com:1158/em/console/aboutApplication
Stopping Oracle Enterprise Manager 11g Database Control ...
... Stopped.
[oracle@host01 ~]
```

- 6) The opatch utility has automated the patch application for the Oracle RAC database homes. It operates by querying existing configurations and automating the steps required for patching each Oracle RAC database home of same version and the GI home.

As the root user, add the directory containing opatch to your path and execute opatch on each node.

The patch is applied in a rolling fashion. Do *not* run opatch in parallel on your cluster nodes.

```
[root@host01~] # export
PATH=/u01/app/oracle/product/11.2.0/dbhome_1/OPatch:$PATH

[root@host01 ~]# opatch auto /share -oh
/u01/app/oracle/product/11.2.0/dbhome_1 -ocmrf
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/ocm.rsp
Executing /usr/bin/perl
/u01/app/11.2.0/grid/OPatch/crs/patchl12.pl -patchdir / -
patchn share -oh /u01/app/oracle/product/11.2.0/dbhome_1 -
ocmrf /home/oracle/solutions/less_10/catchup/ocm.rsp -
paramfile /u01/app/11.2.0/grid/crs/install/crsconfig_params
opatch auto log file location is
/u01/app/11.2.0/grid/OPatch/crs/../../cfgtoollogs/opatchauto20
12-05-24_07-08-51.log
Detected Oracle Clusterware install
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
patch //share/13696251/custom/server/13696251 apply
successful for home /u01/app/oracle/product/11.2.0/dbhome_1
patch //share/13696216 apply successful for home
/u01/app/oracle/product/11.2.0/dbhome_1

#### Proceed to second node ####
[root@host01~]# ssh host02
root@host02's password:

[root@host02~] # export
PATH=/u01/app/oracle/product/11.2.0/dbhome_1/OPatch:$PATH

[root@host02 ~]# opatch auto /share -oh
/u01/app/oracle/product/11.2.0/dbhome_1 -ocmrf
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/ocm.rsp
```

```

Executing /usr/bin/perl
/u01/app/11.2.0/grid/OPatch/crs/patch112.pl -patchdir / -
patchn share -oh /u01/app/oracle/product/11.2.0/dbhome_1 -
ocmrf /home/oracle/solutions/less_10/catchup/ocm.rsp -
paramfile /u01/app/11.2.0/grid/crs/install/crsconfig_params
opatch auto log file location is
/u01/app/11.2.0/grid/OPatch/crs/../../cfgtoollogs/opatchauto20
12-05-24_07-14-56.log
Detected Oracle Clusterware install
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
patch //share/13696251/custom/server/13696251 apply
successful for home /u01/app/oracle/product/11.2.0/dbhome_1
patch //share/13696216 apply successful for home
/u01/app/oracle/product/11.2.0/dbhome_1

#### Proceed to third node ####
[root@host02~]# ssh host03
root@host03's password:

[root@host03 ~]# export
PATH=/u01/app/oracle/product/11.2.0/dbhome_1/OPatch:$PATH

[root@host03 ~]# opatch auto /share -oh
/u01/app/oracle/product/11.2.0/dbhome_1 -ocmrf
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/ocm/ocm.rsp

Executing /usr/bin/perl
/u01/app/11.2.0/grid/OPatch/crs/patch112.pl -patchdir / -
patchn share -oh /u01/app/oracle/product/11.2.0/dbhome_1 -
ocmrf /home/oracle/solutions/less_10/catchup/ocm.rsp -
paramfile /u01/app/11.2.0/grid/crs/install/crsconfig_params
opatch auto log file location is
/u01/app/11.2.0/grid/OPatch/crs/../../cfgtoollogs/opatchauto20
12-05-24_07-22-19.log
Detected Oracle Clusterware install
Using configuration parameter file:
/u01/app/11.2.0/grid/crs/install/crsconfig_params
patch //share/13696251/custom/server/13696251 apply
successful for home /u01/app/oracle/product/11.2.0/dbhome_1
patch //share/13696216 apply successful for home
/u01/app/oracle/product/11.2.0/dbhome_1
[root@host03 ~]# exit
[root@host02 ~]# exit
[root@host01 ~]#

```

- 7) Make sure the patch has been successfully applied on all three nodes by using the `opatch lsinv` command.

```

[oracle@host01 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/opatch lsinv

```


Oracle Interim Patch Installer version 11.2.0.3.0
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Oracle Home : /u01/app/11.2.0/grid
Central Inventory : /u01/app/oraInventory
from : /u01/app/11.2.0/grid/oraInst.loc
OPatch version : 11.2.0.3.0
OUI version : 11.2.0.3.0
Log file location :
/u01/app/11.2.0/grid/cfgtoollogs/opatch/opatch2012-05-10_04-10-25AM_1.log

Lsinventory Output file location :
/u01/app/11.2.0/grid/cfgtoollogs/opatch/lsinv/lsinventory2012-05-10_04-10-25AM.txt

Installed Top-level Products (1):

Oracle Grid Infrastructure
11.2.0.3.0
There are 1 products installed in this Oracle Home.

Interim patches (2) :

Patch 13696216 : applied on Wed May 09 11:40:34 UTC 2012
Unique Patch ID: 14600705
Patch description: "Database Patch Set Update : 11.2.0.3.2 (13696216)"

Created on 3 Apr 2012, 22:02:51 hrs PST8PDT
Sub-patch 13343438; "Database Patch Set Update : 11.2.0.3.1 (13343438)"

Bugs fixed:
13070939, 13035804, 10350832, 13632717, 13041324,
12919564, 13420224
13742437, 12861463, 12834027, 13742438, 13332439,
13036331, 13499128
12998795, 12829021, 13492735, 9873405, 13742436,
13503598, 12960925
12718090, 13742433, 12662040, 9703627, 12905058,
12938841, 13742434
12849688, 12950644, 13362079, 13742435, 12620823,
12917230, 12845115
12656535, 12764337, 13354082, 12588744, 11877623,
12612118, 12847466
13742464, 13528551, 12894807, 13343438, 12582664,
12780983, 12748240
12797765, 12780098, 13696216, 12923168, 13466801,
13772618, 11063191, 13554409

Patch 13696251 : applied on Wed May 09 11:29:18 UTC 2012

Unique Patch ID: 14600705

...

Rac system comprising of multiple nodes

Local node = host01

Remote node = host02

Remote node = host03

OPatch succeeded.

[oracle@host01 ~]\$ **ssh host02**

[oracle@host02 ~]\$

/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/opatch lsinv

Oracle Interim Patch Installer version 11.2.0.3.0

Copyright (c) 2012, Oracle Corporation. All rights reserved.

Oracle Home : /u01/app/oracle/product/11.2.0/dbhome_1

Central Inventory : /u01/app/oraInventory

from :

/u01/app/oracle/product/11.2.0/dbhome_1/oraInst.loc

OPatch version : 11.2.0.3.0

OUI version : 11.2.0.3.0

Log file location :

/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/opa
tch2012-05-29_08-37-09AM_1.log

Lsinventory Output file location :

/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/lsi
nv/lsinventory2012-05-29_08-37-09AM.txt

Installed Top-level Products (1):

Oracle Database 11g

11.2.0.3.0

There are 1 products installed in this Oracle Home.

Interim patches (2) :

Patch 13696216 : applied on Thu May 24 07:19:44 UTC 2012

Unique Patch ID: 14600705

Patch description: "Database Patch Set Update : 11.2.0.3.2
(13696216)"

Created on 3 Apr 2012, 22:02:51 hrs PST8PDT

Sub-patch 13343438; "Database Patch Set Update : 11.2.0.3.1
(13343438)"

Bugs fixed:

```

13070939, 13035804, 10350832, 13632717, 13041324,
12919564, 13420224
13742437, 12861463, 12834027, 13742438, 13332439,
13036331, 13499128
12998795, 12829021, 13492735, 9873405, 13742436,
13503598, 12960925
12718090, 13742433, 12662040, 9703627, 12905058,
12938841, 13742434
12849688, 12950644, 13362079, 13742435, 12620823,
12917230, 12845115
12656535, 12764337, 13354082, 12588744, 11877623,
12612118, 12847466
13742464, 13528551, 12894807, 13343438, 12582664,
12780983, 12748240
12797765, 12780098, 13696216, 12923168, 13466801,
13772618, 11063191, 13554409
...

Rac system comprising of multiple nodes
  Local node = host02
  Remote node = host01
  Remote node = host03
-----

OPatch succeeded.

[oracle@host02 ~]$ ssh host03

[oracle@host03 ~]$
/u01/app/oracle/product/11.2.0/dbhome_1/OPatch/opatch lsinv

Oracle Interim Patch Installer version 11.2.0.3.0
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Oracle Home      : /u01/app/oracle/product/11.2.0/dbhome_1
Central Inventory : /u01/app/oraInventory
   from           :
/u01/app/oracle/product/11.2.0/dbhome_1/oraInst.loc
OPatch version    : 11.2.0.3.0
OUI version       : 11.2.0.3.0
Log file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/opa
tch2012-05-29_08-37-09AM_1.log


Lsinventory Output file location :
/u01/app/oracle/product/11.2.0/dbhome_1/cfgtoollogs/opatch/lsi
nv/lsinventory2012-05-29_08-37-09AM.txt

-----

Installed Top-level Products (1):

```

```

Oracle Database 11g
11.2.0.3.0
There are 1 products installed in this Oracle Home.

Interim patches (2) :

Patch 13696216      : applied on Thu May 24 07:19:44 UTC 2012
Unique Patch ID:    14600705
Patch description:   "Database Patch Set Update : 11.2.0.3.2
(13696216)"
    Created on 3 Apr 2012, 22:02:51 hrs PST8PDT
Sub-patch 13343438; "Database Patch Set Update : 11.2.0.3.1
(13343438)"
    Bugs fixed:
        13070939, 13035804, 10350832, 13632717, 13041324,
12919564, 13420224
        13742437, 12861463, 12834027, 13742438, 13332439,
13036331, 13499128
        12998795, 12829021, 13492735, 9873405, 13742436,
13503598, 12960925
        12718090, 13742433, 12662040, 9703627, 12905058,
12938841, 13742434
        12849688, 12950644, 13362079, 13742435, 12620823,
12917230, 12845115
        12656535, 12764337, 13354082, 12588744, 11877623,
12612118, 12847466
        13742464, 13528551, 12894807, 13343438, 12582664,
12780983, 12748240
        12797765, 12780098, 13696216, 12923168, 13466801,
13772618, 11063191, 13554409
    ...

Rac system comprising of multiple nodes
    Local node = host03
    Remote node = host01
    Remote node = host02
-----

OPatch succeeded.

[oracle@host03 ~]$ exit
[oracle@host02 ~]$ exit

[oracle@host01 ~]$

```

- 8) Make sure that the database and all cluster resources are up on all three nodes.

```

[oracle@host01 ~]$ /u01/app/11.2.0/grid/bin/crsctl stat res -t
-----
NAME                                TARGET    STATE      SERVER
STATE_DETAILS

```

----- Local Resources -----			
ora.DATA.dg	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.FRA.dg	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.LISTENER.lsnr	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.asm	ONLINE	ONLINE	host01
Started	ONLINE	ONLINE	host02
Started	ONLINE	ONLINE	host03
Started			
ora.gsd	OFFLINE	OFFLINE	host01
	OFFLINE	OFFLINE	host02
	OFFLINE	OFFLINE	host03
ora.net1.network	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.ons	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
ora.registry.acfs	ONLINE	ONLINE	host01
	ONLINE	ONLINE	host02
	ONLINE	ONLINE	host03
----- Cluster Resources -----			
ora.LISTENER_SCAN1.lsnr			
1	ONLINE	ONLINE	host02
ora.LISTENER_SCAN2.lsnr			
1	ONLINE	ONLINE	host03
ora.LISTENER_SCAN3.lsnr			
1	ONLINE	ONLINE	host01
ora.cvu			
1	ONLINE	ONLINE	host01
ora.host01.vip			
1	ONLINE	ONLINE	host01
ora.host02.vip			
1	ONLINE	ONLINE	host02

ora.host03.vip				
1	ONLINE	ONLINE		host03
ora.oc4j				
1	ONLINE	ONLINE		host01
ora.orcl.db				
1	ONLINE	ONLINE		host02
Open				
2	ONLINE	ONLINE		host01
Open				
3	ONLINE	ONLINE		host03
Open				
ora.scan1.vip				
1	ONLINE	ONLINE		host02
ora.scan2.vip				
1	ONLINE	ONLINE		host03
ora.scan3.vip				
1	ONLINE	ONLINE		host01
[grid@host01 ~]\$				

Practices for Lesson 11

In these practices, you will create a RAC One Node Database.

Practice 11-1: RAC One Node

In this practice, you will create a RAC One Node database. You will perform an online database relocation. Finally, you will convert the RAC One Database to an Oracle RAC database.

- 1) First, let's remove the existing RAC database. From your classroom PC desktop, execute `ssh -X oracle@host01` to open a terminal session on host01 as the oracle user. Then navigate to `/u01/app/oracle/product/11.2.0/dbhome_1/bin` and execute DBCA.

```
[vncuser@classroom_pc ~]# ssh -X oracle@host01
oracle@host01's password:

[oracle@host01 ~]# cd
/u01/app/oracle/product/11.2.0/dbhome_1/bin

[oracle@host01 bin]$ ./dbca
```

Step	Screen/Page Description	Choices or Values
a.	Welcome	Select Oracle Real Applications Clusters (RAC) database. Click Next.
b.	Operations	Select Delete a Database . Click Next.
c.	List of cluster databases	Select orcl and click Finish.
d.	Database Configuration Assistant dialog box	You are informed the instances and datafiles will be deleted. Click Yes.
e.	Database Configuration Assistant dialog box	You are informed that database deletion is complete and asked if you want to perform another operation. Click No.
f.	Operations	Click Cancel.
g.	Database Configuration Assistant dialog box	Click Yes to exit DBCA.

- 2) To add the RAC One Node database, start DBCA again.

```
[oracle@host01 bin]$ ./dbca
```

Step	Screen/Page Description	Choices or Values
a.	Welcome	Select Oracle RAC One Node database. Click Next.
b.	Operations	Select Create a Database. Click Next.
c.	Database Templates	Select General Purpose or Transaction Processing. Click Next.
d.	Database Identification	Enter orcl for the Global Database Name, and SID Prefix. Enter SERV1 for the Service Name. Click the Select All button to

Practice 11-1: RAC One Node (continued)

Step	Screen/Page Description	Choices or Values
		select all of your nodes. Click Next.
e.	Management options	Select Configure Database Control for local management and click Next.
f.	Database Credentials	Select "Use the same Administrative password." Enter <code>oracle_4U</code> as the password. Enter it again to confirm. Click Next.
g.	Database File Location	Select Automatic Storage Management (ASM) as the Storage Type. Select Oracle-Managed Files and enter <code>+DATA</code> in the Database Area field. Click Next.
h.	ASM Credentials	Enter the ASMSNMP password, <code>oracle_4U</code> and click OK.
i.	Recovery Configuration	Click Specify Fast Recovery Options. Enter <code>+FRA</code> for the Fast Recovery Area. Accept the default value for the Fast Recovery Area Size. Click Next.
j.	Database Content	Select Sample Schemas and click Next.
k.	Initialization Parameters	Change memory Size (SGA and PGA) to 700 MB. Make sure that the Typical radio button and the Use Automatic Memory Management check box are selected. Click Next.
l.	Database Storage	Accept defaults, click Next.
m.	Creation Options	Select Create Database and click Finish.
n.	Summary	Click OK.
o.	Dialog box	Upon database completion, a dialog box containing the Database Control URL and password management options is displayed. Click Exit.

- 3) As the `oracle` user, check your database configuration using the `srvctl` utility.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$ srvctl config database -d orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/11.2.0/dbhome_1
Oracle user: oracle
Spfile: +DATA/orcl/spfileorcl.ora
Domain:
Start options: open
```

Practice 11-1: RAC One Node (continued)

```
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools: orcl
Database instances:
Disk Groups: DATA,FRA
Mount point paths:
Services: SERV1
Type: RACOneNode
Online relocation timeout: 30
Instance name prefix: orcl
Candidate servers: host01,host02,host03
Database is administrator managed
[oracle@host01 ~]$
```

- 4) Use the `srvctl` utility to check the status of the `orcl` database.

```
[oracle@host01 ~]$ srvctl status database -d orcl
Instance orcl_1 is running on node host01
Online relocation: INACTIVE
```

- 5) Execute `srvctl relocate database -h` to view command usage, then use `srvctl` to perform an online database relocation from `host01` to `host02`.

```
[oracle@host01 ~]$ srvctl relocate database -help

Initiate online relocation of the RAC One Node database.

Usage: srvctl relocate database -d <db_unique_name> {[-n
<target>] [-w <timeout>] | -a [-r]} [-v]
    -d <db_unique_name>      Unique name of database to
relocate
    -n <target>              Target node to which to relocate
database
    -w <timeout>             Online relocation timeout in
minutes
    -a                      Abort failed online relocation
    -r                      Remove target node of failed
online relocation request from the candidate server list of
administrator-managed RAC One Node database
    -v                      Verbose output
    -h                      Print usage
```

- 6) Use `srvctl` to perform an online database relocation from `host01` to `host02`.
Immediately after issuing the command, proceed to the next step!

```
[oracle@host01 ~]$ srvctl relocate database -d orcl -n host02
-w 15 -v
```

```
<<< Immediately go to the next step>>>
```

Practice 11-1: RAC One Node (continued)

```
Configuration updated to two instances
Instance orcl_2 started
Services relocated
Waiting for up to 15 minutes for instance orcl_1 to stop ...
Instance orcl_1 stopped
Configuration updated to one instance
[oracle@host01 ~]$
```

- 7) Open another terminal window as oracle, set the environment and issue the `srvctl status database -d orcl` command several times to monitor the migration process.

```
[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$ srvctl status database -d orcl
Instance orcl_1 is running on node host01
Instance orcl_2 is running on node host02
Online relocation: ACTIVE
Source instance: orcl_1 on host01
Destination instance: orcl_2 on host02

[oracle@host01 ~]$ srvctl status database -d orcl
Instance orcl_2 is running on node host02
Online relocation: ACTIVE
Source instance: orcl_1 on host01
Destination instance: orcl_2 on host02

[oracle@host01 ~]$ srvctl status database -d orcl
Instance orcl_2 is running on node host02
Online relocation: INACTIVE
```

Make sure that instance `orcl_2` is running on `host02` before continuing to the next step

- 8) Let's convert our RAC One Node database to a RAC database. First, shut down the RAC One Node database.

```
[oracle@host01 ~]$ srvctl stop database -d orcl
```

- 9) Use `srvctl` to convert the database and add instances to `host01` and `host03`. When you have added the instances, restart the database.

```
[oracle@host01]$ srvctl convert database -d orcl -c RAC

[oracle@host01]$ srvctl add instance -d orcl -i orcl_1 -n host01

[oracle@host01]$ srvctl add instance -d orcl -i orcl_3 -n host03

[oracle@host01]$ srvctl start database -d orcl
```

Practice 11-1: RAC One Node (continued)

- 10) Execute the `crsctl status server -f` command from the Grid Home. Notice that service configured with the RAC One Database, `SERV1` is active along with its server pool. Use the `srvctl` utility to remove it.

```
[oracle@host01 ~]$ /u01/app/11.2.0/grid/bin/crsctl status
server -f
NAME=host01
STATE=ONLINE
ACTIVE_POOLS=Generic ora.orcl ora.orcl_SERV1
STATE_DETAILS=

NAME=host02
STATE=ONLINE
ACTIVE_POOLS=Free
STATE_DETAILS=

NAME=host03
STATE=ONLINE
ACTIVE_POOLS=Generic ora.orcl
STATE_DETAILS=

[oracle@host01 ~]$ srvctl remove service -d orcl -s SERV1 -f

[oracle@host01 ~]$ /u01/app/11.2.0/grid/bin/crsctl status
server -f
NAME=host01
STATE=ONLINE
ACTIVE_POOLS=Generic ora.orcl
STATE_DETAILS=

NAME=host02
STATE=ONLINE
ACTIVE_POOLS=Generic ora.orcl
STATE_DETAILS=

NAME=host03
STATE=ONLINE
ACTIVE_POOLS=Generic ora.orcl
STATE_DETAILS=
```

- 11) Execute the `srvctl config database` command to view the database configuration.

```
[oracle@host01 ~]$ srvctl config database -d orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/11.2.0/dbhome_1
Oracle user: oracle
Spfile: +DATA/orcl/spfileorcl.ora
Domain:
```

Practice 11-1: RAC One Node (continued)

```
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools: orcl
Database instances: orcl_1,orcl_2,orcl_3
Disk Groups: DATA,FRA
Mount point paths:
Services:
Type: RAC
Database is administrator managed
[oracle@host01 ~]$
```

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