**Oracle Database 19*c*: Data Guard Administration**

**Activity Guide**

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Practices for Lesson 1: Introduction to Oracle Data Guard

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**Practices for Lesson 1: Overview**

In these practices, you will examine the lab environment to become familiar with the lab architecture.

# Practice 1-1: Laboratory Introduction

### Overview

In this practice you will become familiar with the laboratory environment.

### Assumptions

Access to your laboratory environment will be through a graphical display running on your classroom workstation or hosted on a remote machine. Your instructor will provide you with the instructions to access your practice environment. Depending on how you connect to the console for the graphical display, you could be logged in as the root, oracle, or vncuser account initially. The lab practices will indicate which user is needed to perform a particular task. Use the switch user command (su – *username*) to change from the default login account to the account needed for a particular task when necessary. The default password for all three accounts is oracle.

The practice environment for this course is hosted on a server (desktop) running Oracle VM Server for x86 as the base installed operating system. Oracle VM Server (OVS) allows for the creation of multiple virtual machines (VMs). Each VM is a logically separate server running a distinct version of Oracle Linux, along with Oracle Database 12*c* Release 1 software and components from Oracle Enterprise Manager Cloud Control 12*c*.

**Note:** The Oracle VM server is running on your desktop computer, and there are 5 virtual machines running within the Oracle VM server, each running one or more database instances and agent software. Your desktop machines were not sized for this type of workload, so there will be some delays in running the lab tasks. Previous editions of this course required many students to share a single resource. The new architecture allows significantly more Data Guard environments for a single classroom.

### Tasks

1. Open a terminal window and determine what account name is the login account. If needed, switch to the root user and verify.

$ **id**

uid=500(vncuser) gid=500(vncuser) groups=500(vncuser)

$ **su –**

Password: **oracle**

# **id**

uid=0(root) gid=0(root) groups=0(root), 1(bin), 2(daemon), 3(sys), 4(adm), 6(disk), 10(wheel)

**Note:** Each classroom where this course is taught could be running a different version of Oracle Virtual Server (OVS). This does not have any effect on the virtual machines running within the OVS, but can impact the desktop being presented to the student. To launch a terminal window, you may be able to right-click anywhere on the desktop background and select a menu item to open a terminal. If this is not available, then try clicking on the top menu bar Applications, Accessories, and then Terminal. Please ask you instructor if these methods do not work.

Practices for Lesson 1: Introduction to Oracle Data Guard

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1. Execute the command **xm list**. You should see output similar to the example below. Domain-0 is the Oracle VM Server and is hosting five additional domains.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # **xm list** |  | | | | |
| Name | ID | Mem | VCPUs | State | Time(s) |
| Domain-0 | 0 | 1024 | 2 | r----- | 25202.6 |
| em12 | 1 | 6656 | 1 | -b---- | 49533.8 |
| host01 | 2 | 2048 | 1 | -b---- | 1988.1 |
| host02 | 3 | 1536 | 1 | -b---- | 1957.8 |
| host03 | 4 | 2048 | 1 | -b---- | 1939.4 |
| host04 | 5 | 1536 | 1 | -b---- | 1965.7 |

1. Determine the hostname of Domain-0, the Oracle VM Server that you are currently using. Your output should be different from the example output shown. This will be referred to as dom0 in the lab prompts used for this document.

# **hostname**

edrsr48p1

**Note:** Throughout the labs you will be required to run commands using a terminal window on specific virtual machines. This lab document will list the user account and hostname of the machine that each command should be run on. Your actual prompts will be different.

1. Examine the /etc/oracle-release and /etc/redhat-release files of Domain-0 to determine the Oracle VM Server for x86 version and also the version of Oracle Linux that it is built with. Additionally, the uname -a command will report the kernel version being used.

[root@dom0]# **cat /etc/oracle-release** Oracle VM Server release 5.7 [root@dom0]# **cat /etc/redhat-release** Oracle VM server release 3.2.1 [root@dom0]# **uname -a**

Linux edrsr48p1 2.6.39-300.22.2.el5uek #1 SMP Fri Jan 4 12:40:29 PST 2013 x86\_64 x86\_64 x86\_64 GNU/Linux

**Note:** Your version of Oracle VM Server may be different than what is shown. Your installation may also not include the oracle-release file depending on your versions. It could also be named ovs-release or enterprise-release. The above example is using Oracle VM Server release 3.2.1 that was built using Oracle Linux x86\_64 version 5.7 as a baseline.

The Unbreakable Enterprise Kernel Release 2 is being used.

1. (Optional) Domain-0 normally does not install sufficient RPM packages to allow for a graphical desktop or display. In the lab environment, additional RPMs have been installed into Domain-0 to provide for a basic gnome desktop environment along with a few applications such as the Firefox web browser. This is an unsupported environment for Oracle VM Server. Determine the version of Firefox running from Domain-0. To launch Firefox from Domain-0, click the menu items for **Applications**, **Internet**, and then **Firefox Web Browser**. When the application Firefox is running, click the menu item **Help** then **About Firefox** to determine the version of Firefox being used. Close down the Firefox application when the version has been determined.

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**Note:** The version of Firefox is limited by the available libraries and RPMs that have been installed into Domain-0, and cannot be upgraded to the newest available versions. You may be running a different version of Firefox than what is shown here, or Firefox may not even be installed into your Domain-0.

1. Using the SSH client, connect to host01 as the root OS user. Enter oracle when you are prompted for the password. In the lab environment, always use the -X option of SSH to enable X11 forwarding back to the Domain-0 console window.

[root@dom0]# **ssh -X root@host01**

root@host01's password: **oracle**

1. Verify that you are on host01 and execute the command firefox. Determine which version of Firefox is being used on host01. Exit Firefox when done and also exit the SSH session.

[root@host01]# **hostname**

host01

[root@host01]# **firefox**

…

[root@host01]# **exit**

logout

Connection to host01 closed.

Practices for Lesson 1: Introduction to Oracle Data Guard

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**Note:** An icon has been created on the desktop of Domain-0 that will invoke the newer version of Firefox on host01 running under the oracle account and displaying back to Domain-0 for your convenience. For reference, the command being executed by the icon is: plink –X –ssh –pw oracle –l oracle host01 firefox. All of the VMs are running Oracle Linux Release 6.3 for the base operating system.

1. You will now learn how to shutdown virtual machines. Open a terminal window on the Domain-0 console and switch to the root user if needed. Execute the command **xm shutdown host04** to stop the host04 virtual machine. Verify it has been stopped with the **xm list** command. You may need to reissue the **xm list** command to allow time for host04 to completely shutdown.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [root@dom0]# **xm shutdown host04**  [root@dom0]# **xm list** | | | | | |
| Name | ID | Mem | VCPUs | State | Time(s) |
| Domain-0 | 0 | 1200 | 4 | r----- | 25509.4 |
| em12 | 7 | 5120 | 2 | -b---- | 5.5 |
| host01 | 8 | 1536 | 1 | -b---- | 9.0 |
| host02 | 9 | 1536 | 1 | -b---- | 8.3 |
| host03 | 10 | 1536 | 1 | -b---- | 8.3 |

**Note:** Any of the other virtual machines can be shutdown using similar syntax and replacing the virtual machine name <host04> with the other virtual machine names. This is equivalent to an operating system shutdown command. Prior to shutting down the virtual machines, it would be best to first stop any Oracle Database resources and Oracle Enterprise Manager Cloud Control resources that may be running.

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1. Restart the host04 virtual machine with the following command: **xm create host04**

**/OVS/running\_pool/host04/vm.cfg**. Verify with the **xm list** command.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| [root@dom0]# **xm create /OVS/running\_pool/host04/vm.cfg**  Using config file "/OVS/running\_pool/host04/vm.cfg". Started domain host04 (id=12) | | | | | | | |
| [root@dom0]# | **xm** | **list** |  |  |  |  |  |
| Name |  |  | ID | Mem | VCPUs | State | Time(s) |
| Domain-0 |  |  | 0 | 1200 | 4 | r----- | 25509.4 |
| em12 |  |  | 7 | 5120 | 2 | -b---- | 5.5 |
| host01 |  |  | 8 | 1536 | 1 | -b---- | 9.0 |
| host02 |  |  | 9 | 1536 | 1 | -b---- | 8.3 |
| host03 |  |  | 10 | 1536 | 1 | -b---- | 8.3 |
| host04 |  |  | 12 | 1536 | 1 | r----- | 5.9 |

**Note:** Any of the other virtual machines can be started up using similar syntax and replacing the virtual machine name <host04> with any other virtual machine name in the command.

1. Verify that the Oracle Management Server and Oracle Agent are running on the em12

virtual machine. You can do this from the Domain-0 with the following commands:

plink -X -ssh -pw oracle -l oracle em12

/u01/app/oracle/middleware/oms/bin/emctl status oms

plink -X -ssh -pw oracle -l oracle em12

/u01/app/oracle/agent/agent\_inst/bin/emctl status agent

**Note:** If you are asked to store the key in the cache, then type "y" at the prompt.

[root@dom0]# **plink -X -ssh -pw oracle -l oracle em12**

**/u01/app/oracle/middleware/oms/bin/emctl status oms**

Oracle Enterprise Manager Cloud Control 12c Release 3

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WebTier is Up

Oracle Management Server is Up

[root@dom0]# **plink -X -ssh -pw oracle -l oracle em12**

**/u01/app/oracle/agent/agent\_inst/bin/emctl status agent**

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Agent Version : 12.1.0.3.0 OMS Version : 12.1.0.3.0

Protocol Version : 12.1.0.1.0

Agent Home : /u01/app/oracle/agent/agent\_inst Agent Binaries : /u01/app/oracle/agent/core/12.1.0.3.0 Agent Process ID : 1880

Parent Process ID : 1833

Agent URL : https://em12.example.com:3872/emd/main/

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Repository URL : https://em12.example.com:4903/empbs/upload Started at : 2013-05-14 21:08:33

Started by user : oracle

Last Reload : (none)

Last successful upload 22:13:58

Last attempted upload 22:13:58

: 2013-05-14

: 2013-05-14

Total Megabytes of XML files uploaded so far : 0.11

Number of XML files pending upload Size of XML files pending upload(MB)

Available disk space on upload filesystem

Collection Status enabled

Heartbeat Status

Last attempted heartbeat to OMS 22:13:58

Last successful heartbeat to OMS 22:13:58

Next scheduled heartbeat to OMS 22:14:58

: 0

: 0

: 60.99%

: Collections

: Ok

: 2013-05-14

: 2013-05-14

: 2013-05-14

Agent is Running and Ready

**Note:** If the Oracle Management Server and Oracle Agent are not running, they can be started with the following sequence of commands:

* 1. **ssh –X oracle@em12** (Password is oracle)

#### . oraenv emrep

* 1. **lsnrctl start**

#### sqlplus / as sysdba startup

**quit**

#### /u01/app/oracle/middleware/oms/bin/emctl start oms

* 1. **/u01/app/oracle/agent/agent\_inst/bin/emctl start agent**

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**Note:** The following commands can be used to shutdown Oracle Enterprise Manager Cloud Control 12*c* on the em12 virtual machine.

1. **ssh –X oracle@em12** (Password is oracle)

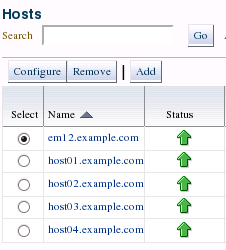
#### /u01/app/oracle/middleware/oms/bin/emctl stop oms -all

1. **/u01/app/oracle/agent/agent\_inst/bin/emctl stop agent**

#### . oraenv emrep

1. **sqlplus / as sysdba shutdown**

#### quit

1. **lsnrctl stop**
2. Use the icon on the desktop to launch Firefox on host01. The default web page should be stored as https://em12.example.com:7802/em and prompt for a login to Enterprise Manager Cloud Control 12*c*. The URL will change after it is entered and used. Log in to the application with the credentials of **sysman** for user name and **oracle\_4U** for the password. The password is case sensitive. Select from the menu **Targets** and then **Hosts**, and verify that the agent is running on all five virtual machines.
3. Click "Log Out" in the upper right corner of the application and then exit Enterprise Manager Cloud Control 12*c* when done.

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Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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**Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control**

**Chapter 2**

# Practices for Lesson 2: Overview

### Practices Overview

In these practices, you will use Oracle Enterprise Manager Cloud Control 12*c* Release 3 (12.1.0.3.0) to create a physical standby database. You will then use Oracle Enterprise Manager Cloud Control 12*c* to verify, examine, test, and monitor the Data Guard Environment.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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# Practice 2-1: Creating a Physical Standby Database Using Enterprise Manager

### Overview

In this practice you create a physical standby database using Oracle Enterprise Manager Cloud Control 12*c* Release 3 (12.1.0.3.0). In preparation for this lab and to save time, Enterprise Manager has already been installed on the virtual machine em12.example.com. On the other 4 virtual machines (host01, host02, host03, host04), the Oracle Database 12*c* Release 1 (12.1.0.1.0) software binaries have been installed into the following directory:

/u01/app/oracle/product/12.1.0/dbhome\_1. In addition to the Oracle Database software binaries, the Oracle Enterprise Manager agent has been deployed on each machine to the following directory: /u01/app/oracle/agent. Global default and target preferred credentials were defined for each host.

### Tasks

1. Use the icon on the desktop to launch Firefox on host01. The default web page should be stored as https://em12.example.com:7802/em and prompt for a login to Enterprise Manager Cloud Control 12*c*. Log in to the application with the credentials of **sysman** for user name and **oracle\_4U** for the password. The password is case sensitive.

**Note:** The default home page displayed to the user when logging in can be changed. It is currently set to display the **All Targets** web page. To change the home page for the user, click the username in the top right corner (SYSMAN), and then select **Welcome Page** from the drop down menu that appears. You can change your default home page if desired. This is a matter of job role and personal preference. In this lab document, navigation instructions will be provided using the top level menu bar that is available on all personal home pages.

1. Navigate to the Databases page by selecting **Targets**, and then **Databases** from the drop down menu that appears. You should see two databases that have been discovered by Oracle Enterprise Manager Cloud Control. The emrep.example.com database is the repository database used by Oracle Enterprise Manager Cloud Control. Do not make any modifications to this database.
2. Navigate to the **boston.example.com** specific database page by clicking on its name from the databases page.
3. Launch the **Add Standby Database** wizard by selecting it from the Availability menu.
4. On the Add Standby Database Wizard page, select the option to "**Create a new physical standby database**" and then click **Continue**.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. On the Add Standby Database: Backup Type page (step 1 of 6), select "**Online Backup**", the option to "**Use Recovery Manager (RMAN) to copy database files**" and then click **Next**.
2. On the Add Standby Database: Backup Options page (step 2 of 6), set the degree of parallelism to **1**. In the Primary Host Credentials section, select the "**Named**" option for the type of credential and then set the credential name to "NC\_HOST\_ORACLE." In the Primary Database Standby Redo Log Files section, **uncheck** the box to use Oracle-managed files (OMF). Provide the following file names for the Standby Redo Logs that will be created on the primary database:

|  |
| --- |
| **Log File Location** |
| /u01/app/oracle/oradata/boston/**stbyredo01.log** |
| /u01/app/oracle/oradata/boston/**stbyredo02.log** |
| /u01/app/oracle/oradata/boston/**stbyredo03.log** |
| /u01/app/oracle/oradata/boston/**stbyredo04.log** |

Click **Next** to Continue

1. On the Add Standby Database: Database Location page (step 3 of 6), change the **Instance Name** in the Standby Database Attributes section to "**london**" and verify that the Database Storage option is set to File System. In the Standby Database Location section, change the **Host** field to **host03**.example.com and verify the Oracle Home is set to

/u01/app/oracle/product/12.1.0/dbhome\_1. In the Standby host Credentials section, verify that the Named credential option is selected and that the Credential Name is set to NC\_HOST\_ORACLE. Click **Next** to continue.

1. On the Add Standby Database: File Locations page (step 4 of 6), verify that the "**Use Oracle Optimal Flexible Architecture-compliant directory structure (OFA)** is selected and then click the **Customize** button within that section. A table of the Primary Database Names mapped to corresponding Standby Database Names is displayed for datafiles, tempfiles, logfiles, and control files. For each of entries, the primary name "boston" is converted to the standby name "london". Click **OK** to return to the previous page.

**Note:** A Warning message is displayed indicating that 2 files already exist on the standby database host and will be overwritten. Those files are sale1v3.dat and qopiprep.bat. The warning message also indicates that the Fast Recovery Area directory does not exist on the standby database host and that it will be created automatically. Click **Continue**.

1. While still on the Add Standby Database: File Location page (step 4 of 6), enter **LISTENER**

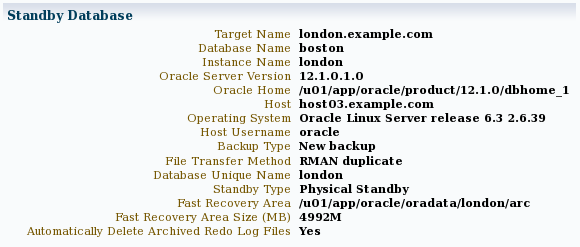
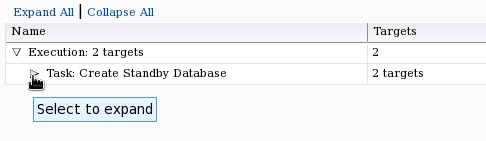
for the Listener Name and **1521** the Primary Database Port. Click **Next**.

1. On the Add Standby Database: Configuration page (step 5 of 6), change the **Database Unique Name** to "**london**" and the **Target Name** to "**london.example.com**". Verify that the Standby Archive Location is set to the value:

/u01/app/oracle/oradata/london/arc. The Use Data Guard Broker should be checked in the Data Guard Broker section. Click **Next**.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

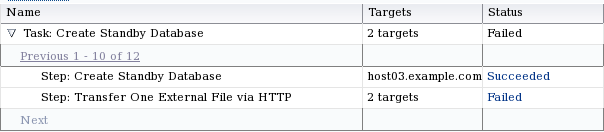
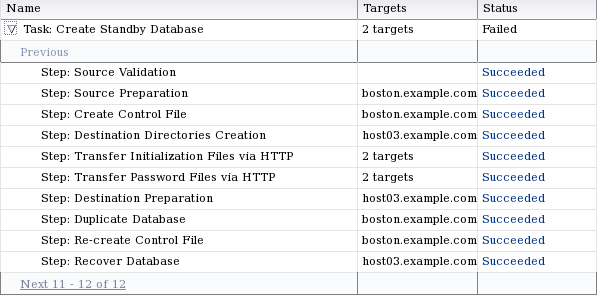
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1. On the Add Standby Database: Review page (Step 6 of 6), verify the accuracy of the typed entries. If any entry has been typed incorrectly, click the back button as many times as needed and correct it. When satisfied, click **Finish**.
2. An information dialog is returned containing a link "**View Job**." Click the View Job link to navigate to the Job Activity page for the boston.example.com database. The **Auto Refresh** option is currently set to "Off." Change this to a **30** second refresh interval.
3. Expand the Task: Create Standby Database by clicking the triangle next to the task as shown in the picture below.

**Note:** This process will take several minutes to complete. Avoid using the desktop computer for other tasks while this is running. You may need to expand the items again each time the page refreshes.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. The job will fail at the last step. Verify that steps 1 through 11 have succeeded as shown in the pictures below. You will need to click the link "**Next 11 - 12 of 12**" to display the remaining two steps.
2. Click the link "**Previous 1 - 10 of 12**" to redisplay the first 10 steps. In the Status column, click the **Succeeded** link for the row "**Step: Destination Preparation**." The output log shows the network listener being started on the standby host, along with a static service "london\_DGMGRL.example.com" that was created. Scroll to the beginning of the page if necessary and click the link "**Task: Create Standby Database**" to return to the display of the first 10 steps.
3. In the Status column, click the **Succeeded** link for the row "**Step: Duplicate Database**." The output log contains the Recovery Manager (RMAN) script that was used to perform the online backup of the primary database.
4. On the main Enterprise Manager menu, click **Targets** and then **Databases**. You should now see an entry for the london.example.com physical standby database instance.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

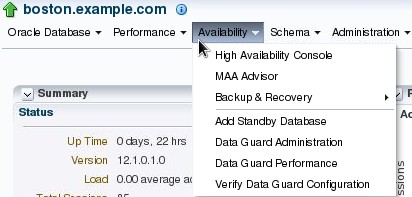
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# Practice 2-2: Verify and Examine the Data Guard Environment

### Overview

In this practice you will verify the Data Guard configuration and examine some of the changes implemented by the Add Standby Database wizard.

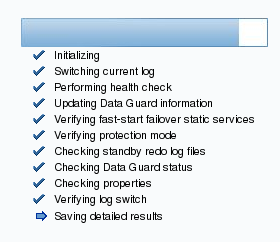
### Tasks

1. While still on the Targets -> Databases page from the last lab step, click on the link for the primary database instance boston.example.com to navigate to its home page. Click on the Availability menu item and note that the only Data Guard related item is the Add Standby Database wizard as shown in the picture of Practice 2-1 Step 4. Click the "Log Out" menu item in the top right corner. When prompted, select the option to "Logout of Enterprise Manager and all targets."
2. Login to Enterprise Manager Cloud Control 12*c*. Log in to the application with the credentials of **sysman** for user name and **oracle\_4U** for the password. The password is case sensitive. Navigate to the Databases page by selecting **Targets**, and then **Databases** from the drop down menu that appears. On the Databases page, click the link for the boston.example.com target.
3. On the boston.example.com database home page, click the Availability menu item and note the additional menu entries.

**Note:** If only the "Add Standby Database" link is visible, then select it. It will not launch the "Add Standby Database" wizard, but instead will navigate to the Data Guard home page.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Select the "Verify Data Guard Configuration" item from the menu. The picture below shows the steps performed while verifying the configuration. After verification completes, detailed results are then displayed.

**Note:** If your menu does not have the link "Verify Data Guard Configuration", then use the link "**Verify Configuration**" located in the bottom section of the page. The verify process will complete with warnings. You can ignore the 2 warnings regarding the step to check the agent status.

1. Click **OK**. The Data Guard Administration page is then displayed.
2. Examine initialization parameter changes implemented by the Add Standby Database wizard for the primary database. Click **Administration** > **Initialization Parameters**. Click the **Show All** button to display a complete list of initialization parameters on a single web page. You can click the triangle in the Name column to sort the values by Name.

|  |  |
| --- | --- |
| **Name** | **Value** |
| dg\_broker\_config\_file1 | /u01/app/oracle/fast\_recovery\_area/dr1boston.dat |
| dg\_broker\_config\_file2 | /u01/app/oracle/fast\_recovery\_area/dr2boston.dat |
| dg\_broker\_start | TRUE |
| log\_archive\_config | dg\_config=(boston,london) |
| log\_archive\_dest\_2 | 'valid\_for=(online\_logfile,all\_roles)', 'service="(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)  (HOST=host03.example.com)(PORT=1521))(CONNECT\_DA TA=(SERVICE\_NAME=london.example.com)(SERVER=DEDI CATED)))"', 'ASYNC NOAFFIRM delay=0 optional compression=disable max\_failure=0 max\_connections=1 reopen=300 db\_unique\_name="london" net\_timeout=30' |

Additional Data Guard related initialization parameters include (not a complete list): archive\_lag\_target, db\_file\_name\_convert, fal\_client, fal\_server, log\_file\_name\_convert, log\_archive\_max\_processes, log\_archive\_min\_succeed\_dest, log\_archive\_dest\_n, log\_archive\_dest\_state\_n, and standby\_file\_management.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Select **Targets** > **All Targets** from the menu. It may be necessary to click the red 'X' icon in the refine search section to remove any search filters. This will allow a complete list of targets to be displayed. You can also click the Home icon in the top right corner since the personal home page was set to display all targets. Select Target Type of **Listener** in the refine search section. Notice that only 2 listeners have been discovered by Enterprise Manager. They include LISTENER\_em12.example.com and LISTENER\_host01.example.com.
2. Discover the network listener that was created on host03. Select **Setup** > **Add Target** > **Configure Auto Discovery** from the menu. In the Agent-based Auto Discovery Section, click the **wrench icon** next to the row item "**All Discovery Modules**." To highlight the row, click on the gray background area within the first un-named column next to Agent Host Name **host03.example.com** or within the row section underneath "Enabled Discovery Modules." Avoid clicking the active links that will navigate away from this page. With the row highlighted, click the "**Run Discovery Now**" link. Click "**Yes**" on the dialog window that appears. Click **Close** on the completion dialog window that appears.
3. For the row with the Agent Host Name of "host03.example.com", click the number **1** in the column "**Discovered Targets**." You should now see the network listener for host03. **Highlight the row** containing LISTENER\_host03.example.com and click the **Promote** link. On the Promote Unmanaged Target page that appears, click the **Promote** button leaving all fields with default values. Click **Close** on the promote target confirmation dialog that appears. Click **Targets** > **All Targets** to return to the list of Listeners. Select the **LISTENER\_host03.example.com** link to navigate to its web page.
4. On the LISTENER\_host03.example.com page, select from the menu **Oracle Listener** > **Edit Listener**. Select the **Named** option for the Credential and then select **NC\_HOST\_ORACLE** for the Credential Name. Click the **Login** button. Click the "Static **Database Registration**" tab to view the Service Name entry (london\_DGMGRL.example.com) that was created for the Data Guard broker. Click **Cancel** to exit out of the Edit Listener page.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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# Practice 2-3: Generating a Test Workload

### Overview

In this practice, you will generate a test workload on the primary database that will cause log switches to occur. Enterprise Manager graphs will then be examined to display redo generation rates, lag times, and apply rates.

### Tasks

1. With the navigation techniques learned from previous steps, navigate to the boston.example.com database home page. From the menu, select **Availability** > **Data Guard Performance**.

**Note:** If the menu doesn't show this link, then select **Availability** > **Add Standby Database**. If you are taken to the Add Standby Database wizard, then click the **Cancel** button. You will then be taken to the Data Guard home page for the boston primary database. From there, you can find a Data **Guard Performance** link in the lower left section of the web page.

1. In the Test Application section, click the **Start** button to generate a load on the primary database.
2. Click the **Refresh Page icon** periodically located next to the View Data field. After running for a few minutes, the 3 graphs on the Data Guard Performance page should begin to reflect the workload being generated for the Data Guard environment. You should see the Transactions per second number increase. You can click any of the charts to display historical metrics.
3. When you have finished analyzing the graphs, click the **Stop** button in the Test Application section.
4. You can explore using Enterprise Manager in a Data Guard environment for the current two databases. Both databases (boston.example.com and london.example.com) will be deleted in the next section in preparation for learning to manage a Data Guard environment using command-line tools.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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# Practice 2-4: Preparing for Command-line Practices

### Overview

In this practice, you will remove the boston.example.com from host01 and the

london.example.com database from host03 in preparation for command-line practices.

### Tasks

1. Navigate to the **boston.example.com** database home page. Click **Availability** > **Data Guard Administration** from the menu. In the Standby Databases section, click the **Remove** button. Click "**Yes**" on the confirmation page.

**Note:** If the menu doesn't show this link, then select **Availability** > **Add Standby Database**. If you are taken to the Add Standby Database wizard, then click the **Cancel** button. You will then be taken to the Data Guard home page for the boston primary database.

1. Navigate to **Targets** > **Databases**. Highlight the row for the london.example.com database and click the **Remove** link. Click the **Yes** button on the Warning page. Highlight the row for the boston.example.com database and click the **Remove** link. Click the **Yes** button on the Warning page.
2. Click **Targets** > **All Targets** on the menu. Remove any filters in the Refine Search area if needed to display a complete list of targets. Click the "**Listener (3)**" link found under the tree structure Target Type > Databases > Listener within the Refine Search section. The three listeners should be listed: LISTENER\_em12.example.com, LISTENER\_host01.example.com, and LISTENER\_host03.example.com.
3. Without clicking, hover the mouse pointer on top of the row LISTENER\_host01.example.com. The row should highlight. **Right-click** using the mouse button to display a context menu. Select **Target Setup** > **Remove Target** from the menu. Click the **Yes** button on the confirmation window that appears. Click **OK**.
4. Repeat step 6 and remove LISTENER\_host03.example.com.
5. Click the "**Log Out**" menu item in the top right corner. Close down the Firefox browser session and return to the Domain-0 console desktop.
6. Open a terminal session if needed. Switch to the root account. In the home directory, launch the stopcloudcontrol.sh script. Enter "y" to Store the key in cache if you are prompted on each machine.

[anyuser@dom0]$ **su -**

Password: oracle

[root@dom0]$ **./stopcloudcontrol.sh**

\*\*\*\*\* Stopping agent on host01 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

Copyright (c) 1996, 2013 Oracle Corporation. All rights reserved.

Stopping agent stopped.

\*\*\*\*\* Stopping agent on host02 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

Copyright (c) 1996, 2013 Oracle Corporation. All rights reserved.

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Stopping agent stopped.

\*\*\*\*\* Stopping agent on host03 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

Copyright (c) 1996, 2013 Oracle Corporation. All rights reserved.

Stopping agent stopped.

\*\*\*\*\* Stopping agent on host04 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

Copyright (c) 1996, 2013 Oracle Corporation. All rights reserved.

Stopping agent stopped.

\*\*\*\*\* Stopping OMS on em12 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

Copyright (c) 1996, 2013 Oracle Corporation. All rights reserved.

Stopping WebTier...

WebTier Successfully Stopped Stopping Oracle Management Server...

Oracle Management Server Successfully Stopped AdminServer Successfully Stopped

Oracle Management Server is Down

\*\*\*\*\* Stopping agent on em12 \*\*\*\*\*

Oracle Enterprise Manager Cloud Control 12c Release 3

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Stopping agent stopped.

**Note:** Oracle Enterprise Manager Cloud Control will not be used again in this course, but the configuration has been preserved if needed.

1. Stop the em12 virtual machine. Verify that the VM has been stopped.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [root@dom0]# **xm shutdown em12**  [root@dom0]# **xm list** | | | | | |
| Name | ID | Mem | VCPUs | State | Time(s) |
| Domain-0 | 0 | 810 | 4 | r----- | 10855.2 |
| host01 | 7 | 2048 | 1 | -b---- | 4313.0 |
| host02 | 8 | 1536 | 1 | -b---- | 338.3 |
| host03 | 9 | 2048 | 1 | -b---- | 2771.5 |
| host04 | 10 | 1536 | 1 | -b---- | 339.9 |

**Note:** You may need to reissue the XM LIST command if needed while waiting on the virtual machine to stop.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Open a terminal session to host03 using the oracle operating system account.

[root@dom0]# **ssh -X oracle@host03**

oracle@host03's password: **oracle**

Last login: Wed Jul 24 01:11:30 2013 from 192.0.2.1

1. Use the oraenv utility to set the environment variables for the london database instance.

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

ORACLE\_SID = [oracle] ? **london**

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

1. Startup the London database using SQL\*Plus, open the database and then exit SQL\*Plus.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Jul 24 04:52:07

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **alter database open;**

Database altered.

SQL> **exit**

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

1. Start the Database Configuration Assistant (DBCA) utility.

[oracle@host03]$ **dbca**

* 1. Select **Delete Database** on the Database Operation window. Click **Next**.
  2. Select the '**london**' database on the Delete Database window. Click **Next**.
  3. **Uncheck** the box to deregister from Enterprise Manager on the Management Options window. The database has already been deleted from Enterprise Manager. Click **Next**.
  4. Click **Finish** on the Summary window.
  5. Click **Yes** on the information dialog that appears.
  6. Click **OK** on the information dialog that appears.
  7. Click **Close** to exit the DBCA utility.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Stop the network listener on machine host03.

[oracle@host03]$ **lsnrctl stop**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 24-JUL- 2013 04:57:11

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host03.example.com)(PO RT=1521)))

The command completed successfully

1. Navigate to the $ORACLE\_HOME/network/admin directory and delete the network configuration files.

[oracle@host03]$ **cd $ORACLE\_HOME/network/admin** [oracle@host03]$ **rm tnsnames\*** [oracle@host03]$ **rm listener\***

[oracle@host03]$ **rm sqlnet\***

1. Exit the SSH client session to host03, returning the session to Domain-0.

[oracle@host03]$ **exit**

logout

Connection to host03 closed.

[root@dom0]#

1. Open a terminal session to host01 using the oracle operating system account.

[root@dom0]# **ssh -X oracle@host01**

oracle@host01's password: **oracle**

Last login: Wed Jul 24 01:12:18 2013 from 192.0.2.1

1. Use the oraenv utility to set the environment variables for the 'boston' database instance.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [oracle] ? **boston**

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

1. Start the Database Configuration Assistant (DBCA) utility.

[oracle@host01]$ **dbca**

* 1. Select **Delete Database** on the Database Operation window. Click **Next**.
  2. Select the '**boston**' database on the Delete Database window. Click **Next**.
  3. **Uncheck** the box to deregister from Enterprise Manager on the Management Options window. The database has already been deleted from Enterprise Manager. Click **Next**.
  4. Click **Finish** on the Summary window.
  5. Click **Yes** on the information dialog that appears.
  6. Click **OK** on the information dialog that appears.
  7. Click **Close** to exit the DBCA utility.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Stop the network listener on machine host01.

[oracle@host01]$ **lsnrctl stop**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 24-JUL- 2013 04:57:11

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host03.example.com)(PO RT=1521)))

The command completed successfully

1. Navigate to the $ORACLE\_HOME/network/admin directory and delete the network configuration files.

[oracle@host01]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host01]$ **rm listener\***

[oracle@host01]$ **rm sqlnet\***

1. Exit the SSH client session to host01, returning the session to Domain-0.

[oracle@host01]$ **exit**

logout

Connection to host01 closed.

[root@dom0]#

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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# Practice 2-5: Primary Database Creation

### Overview

In this practice, you will create a fresh database for the remainder of the command-line labs in this course.

### Assumptions

The system administrator has provided a server, host01, located in the city of Boston to be used for the new database to be created. Oracle Linux 6.3 has already been installed on the server along with the oracle-rdbms-server-12cR1-preinstall-1.0-8.el6.x86\_64.rpm file to prepare the machine for database software installation. A software only install of the Oracle database software has been performed into the default location of

/u01/app/oracle/product/12.1.0/dbhome\_1. The server was also integrated into the Oracle Enterprise Manager Cloud Control management infrastructure for monitoring with the installation of the agent software into the /u01/app/oracle/agent/agent\_inst home directory.

### Tasks

1. Open a terminal window and use the SSH client to connect to host01 as the oracle OS user. Enter oracle when you are prompted for the password.

[root@dom0]# **ssh -X oracle@host01**

oracle@host01's password: **oracle**

1. Navigate to the /u01/app/oracle/product/12.1.0/dbhome\_1/bin directory. Invoke the Database Configuration Assistant utility.

[oracle@host01]$ **cd /u01/app/oracle/product/12.1.0/dbhome\_1/bin**

[oracle@host01]$ **./dbca**

**Note:** At this starting point, there are no entries in the /etc/oratab file that can be used to set environment variables such as ORACLE\_HOME.

1. On the Database Operation window, select the **Create Database** option and then click

#### Next.

1. On the Creation Mode window, select the **Advanced Mode** option and then click **Next**.
2. On the Database Template window, select the **General Purpose or Transaction Processing** option and then click **Next**.
3. On the Database Identification window, enter **boston.example.com** for the Global Database Name. Check the box to **Create As Container Database**. With the Create a Container Database with one or more PDBs selected, enter **1** for the Number of PDBs, and enter **dev1** as the PDB Name. Click **Next**.
4. On the Management Options window, verify that the box is checked for the option to "**Configure Enterprise Manager (EM) Database Express**." Click Next.
5. On the Database Credentials window, select the option to "**Use the Same Administrative Password for All Accounts**." Enter **oracle\_4U** for the Password and Confirm Password fields. Click Next.
6. On the Network Configuration window, check the box to select the Database home software location. Enter **LISTENER** in the name field, and **1521** in the port field. Click Next.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. On the Storage Locations window, select the option to "**Use Common Location for All Database Files**." Verify that the "**Specify Fast Recovery Area**" box is checked, and adjust the Fast Recovery Area Size field to **10G** bytes. Check the **Enable Archiving** box. Click the "**Edit Archive Mode Parameters**" button and change the name of the Archive Log File Format to "**arch\_%t\_%s\_%r.log**" and then **OK**. Click **Next**.
2. On the Database Options window, check the **Sample Schemas** box and click **Next**.
3. On the Initialization Parameters window, change the **Memory Size (SGA and PGA)** to **496MB**. Verify that the **Use Automatic Memory Management** box is checked. Click on the Character Sets tab, and select the **Use Unicode (AL32UTF8)** option. Click **Next**.
4. On the Creation Options window, verify that the **Create Database** box is checked and then click **Next**.
5. On the Summary window, click **Finish**. It will take some time for the database to create.
6. When a dialog window appears stating that database creation is complete, click **Exit**.
7. Click **Close** to exit the Database Configuration Assistant utility.
8. Use the icon on the desktop to launch Firefox on host01. The home page that is mapped to https://em12.example.com:7802/em will not display since Enterprise Manager Cloud Control has been stopped. Change the URL to https://host01.example.com:5500/em in order to connect to the Enterprise Manager Database Express 12*c* application.
9. You should receive a web page indicating that the connection is un-trusted is this is the very first time you are accessing it. Click on the link "**I Understand the Risks**" and then click the "**Add Exception**" button. In the Add Security Exception window that appears, click the **Confirm Security Exception** button.
10. Login to the Enterprise Manager Database Express 12*c* application with the username **SYS**, password **oracle\_4U**, and with the "**as sysdba**" box checked. You are now connected to the CDB$ROOT container database for the boston.example.com instance. The resources graph and SQL monitor graph will give errors after some time. Exit the Firefox application. It is not necessary to wait for the graphs to give the error.
11. In the terminal window that was used to run the Database Configuration Assistant utility on

host01, set the environment variables to the boston instance.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [oracle] ? **boston**

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

1. Invoke SQL\*Plus connecting with operating system authentication.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Jul 24 20:14:33

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL>

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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1. Display a list of all pluggable databases and their open mode.

SQL> **select name,open\_mode from v$pdbs;**

NAME OPEN\_MODE

PDB$SEED

DEV1

READ ONLY

READ WRITE

1. Use the ALTER SESSION statement to switch to the PDB Dev1 container and verify that it is the current container.

SQL> **alter session set container = dev1;**

Session altered.

SQL> **SELECT SYS\_CONTEXT ('USERENV', 'CON\_NAME') FROM DUAL;**

SYS\_CONTEXT('USERENV','CON\_NAME')

DEV1

1. Setup Enterprise Manager Database Express 12*c* for the pluggable database by defining a distinct port number for it. Exit SQL\*Plus when done.

SQL> **exec dbms\_xdb\_config.sethttpsport(5501);**

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

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

1. Use the icon on the desktop to launch Firefox on host01. Change the URL to **https://host01.example.com:5501/em** in order to connect to the Enterprise Manager Database Express 12*c* application for the Dev1 container.
2. You should receive a web page indicating that the connection is un-trusted is this is the very first time you are accessing it. Click on the link "**I Understand the Risks**" and then click the "**Add Exception**" button. In the Add Security Exception window that appears, click the **Confirm Security Exception** button.
3. Login to the Enterprise Manager Database Express 12*c* application with the username **SYS**, password **oracle\_4U**, and with the "**as sysdba**" box checked. You are now connected to the Dev1 container database for the boston.example.com instance. All graphs on the home page should now display properly. Exit the Firefox application.

Practices for Lesson 2: Creating a Physical Standby Database by Using Enterprise Manager Cloud Control

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Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

Chapter 3 - Page 1

**Practices for Lesson 3: Oracle Net Services in a Data Guard Environment**

**Chapter 3**

# Practices for Lesson 3: Overview

### Practices Overview

In these practices, you will use graphical utilities to create and modify the Oracle network configuration files. You will manually edit the files with a text editor to bypass the current limitations of the Oracle Net Manager utility, and then propagate the resulting files to each server in the Data Guard environment.

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

Chapter 3 - Page 2

# Practice 3-1: Modifying the tnsnames.ora Configuration File

### Overview

In this practice you will modify the tnsnames.ora configuration file using the Graphical Oracle Net Manager utility. You will create service name entries for each database instance that will be used in this course. The following chart summarizes the entries that should be created:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Service Name** | **Host** | **Port** | **SDU** | **\*\_BUF\_SIZE** |
| boston | host01.example.com | 1521 | 65535 | 10485760 |
| bostonFS | host02.example.com | 1521 | 65535 | 10485760 |
| london | host03.example.com | 1521 | 65535 | 10485760 |
| londonFS | host04.example.com | 1521 | 65535 | 10485760 |
| london2 | host03.example.com | 1521 | 65535 | 10485760 |
| prmy | host01.example.com host03.example.com | 1521 | 65535 | 10485760 |
| emrep | em12.example.com | 1521 |  |  |

**Note:** Due to a limitation of the Oracle Net Manager utility, the best practice values listed in the documentation cannot be entered. The maximum value for SDU allowed by Oracle Net Manager is 32767. This will need to be corrected after using the Oracle Net Manager utility by manually editing the configuration files in practice 3-3.

### Tasks

* 1. If you closed the terminal window from the previous practice, then open a terminal window and use the SSH client to connect to host01 as the oracle OS user. Enter oracle when you are prompted for the password.

[anyuser@dom0]$ **ssh -X oracle@host01**

oracle@host01's password: **oracle**

* 1. Use the oraenv utility to set the environment variables for the boston instance.

**Note:** The prompt in the lab exercises will now show the user and host for the machine that you should be connected to. Throughout labs, you will use 5 different hosts and 2 different operating system accounts. Your actual operating system prompt may display additional information such as the current directory. This will not be shown in labs. If the prompt does not show the user and machine as in the above step, it indicates that you should be using the main console window on Domain-0. The Domain-0 name is unique for each student.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [oracle] ? **boston**

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

* 1. Use the lsnrctl utility to check the status of the network listener.

[oracle@host01]$ **lsnrctl status**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 04-JUN- 2013 20:02:49

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Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host01.example.com)(PO RT=1521)))

STATUS of the LISTENER

Alias LISTENER

Version TNSLSNR for Linux: Version 12.1.0.1.0

- Production

Start Date 03-JUN-2013 20:02:58

Uptime 0 days 23 hr. 59 min. 51 sec

Trace Level off

Security ON: Local OS Authentication

SNMP OFF

Listener Parameter File

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

Listener Log File

/u01/app/oracle/diag/tnslsnr/host01/listener/alert/log.xml Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=host01.example.com)(PO RT=1521)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=EXTPROC1521)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=host01.example.com)(P

ORT=5500))(Security=(my\_wallet\_directory=/u01/app/oracle/admin/b oston/xdb\_wallet))(Presentation=HTTP)(Session=RAW))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=host01.example.com)(P

ORT=5501))(Security=(my\_wallet\_directory=/u01/app/oracle/admin/b oston/xdb\_wallet))(Presentation=HTTP)(Session=RAW))

Services Summary...

Service "boston.example.com" has 1 instance(s).

Instance "boston", status READY, has 1 handler(s) for this service...

Service "bostonXDB.example.com" has 1 instance(s).

Instance "boston", status READY, has 1 handler(s) for this service...

Service "dev1.example.com" has 1 instance(s).

Instance "boston", status READY, has 1 handler(s) for this service...

The command completed successfully

**Note:** Notice that the entry Listener Parameter File indicates the location of the configuration files. The location can be set with the ORACLE\_HOME or TNS\_ADMIN environment variables when starting the listener.

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* 1. Navigate to the $ORACLE\_HOME/network/admin directory and examine the contents of the network configuration files (sqlnet.ora, listener.ora, or tnsnames.ora).

[oracle@host01]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host01]$ **cat sqlnet.ora**

# sqlnet.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/sqlnet.ora # Generated by Oracle configuration tools.

NAMES.DIRECTORY\_PATH= (TNSNAMES, ONAMES, HOSTNAME)

[oracle@host01]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

LISTENER = (DESCRIPTION\_LIST =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521))

(ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))

)

)

[oracle@host01]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

BOSTON = (DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = host01.example.com)(PORT

= 1521))

(CONNECT\_DATA = (SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

* 1. Invoke the Oracle Net Manager utility to prepare the networking files for Data Guard. Adjust the tnsnames.ora configuration file by modifying the “boston” service name entry. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.

[oracle@host01]$ **netmgr**

* + 1. Expand the **Local** menu tree item underneath Oracle Net Configuration

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* + 1. Click on the **Profile** menu tree item
    2. Highlight the **EZCONNECT** method under the available methods
    3. Click the '**>**' button to add it to the Selected Methods list
    4. Expand the **Service Naming** menu tree item
    5. Highlight the “boston” entry
    6. Click the **Advanced** button in the Service Identification section
    7. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
    8. Click the **OK** button
    9. Click the **Show Advanced** button in the Address Configuration section
    10. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
  1. Create a new Service Name “bostonFS” on host02.example.com. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **bostonFS** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **host02.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **bostonFS.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
     8. Highlight the "**bostonFS**" entry
     9. Click the **Advanced** button in the **Service Identification section**
     10. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
     11. Click the **OK** button
     12. Click the **Show Advanced** button in the Address Configuration section
     13. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
  2. Create a new Service Name “london” on host03.example.com. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **london** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **host03.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **london.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
     8. Highlight the "**london**" entry
     9. Click the **Advanced** button in the Service Identification section

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* + 1. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
    2. Click the **OK** button
    3. Click the **Show Advanced** button in the Address Configuration section
    4. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
  1. Create a new Service Name “londonFS” on host04.example.com. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **londonFS** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **host04.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **londonFS.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
     8. Highlight the "**londonFS**" entry
     9. Click the **Advanced** button in the Service Identification section
     10. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
     11. Click the **OK** button
     12. Click the **Show Advanced** button in the Address Configuration section
     13. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
  2. Create a new Service Name “london2” on host03.example.com. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **london2** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **host03.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **london2.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
     8. Highlight the "**london2**" entry
     9. Click the **Advanced** button in the Service Identification section
     10. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
     11. Click the **OK** button
     12. Click the **Show Advanced** button in the Address Configuration section
     13. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section

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* 1. Create a new Service Name “prmy” on host01.example.com and host03.example.com simultaneously. Set the Session Data Unit to 64K bytes, and both the Send Buffer Size and Receive Buffer Size to 10M bytes.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **prmy** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **host01.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **prmy.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
     8. Highlight the "**prmy**" entry
     9. Click the **Advanced** button in the Service Identification section
     10. Enter **32767** for the Session Data Unit (**Note:** The documentation recommends a value of 65535, but the Oracle Net Manager utility currently limits this value to 32767)
     11. Click the **OK** button
     12. Click the **Show Advanced** button in the Address Configuration section
     13. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
     14. Click the green **+** sign **within the Address Configuration** section to add a second address.
     15. Change the Host Name field to a value of **host03.example.com** and the Port Number field to **1521**.
     16. Click the **Show Advanced** button in the Address Configuration section
     17. Enter **10485760** for both the **Send Buffer Size** and the **Receive Buffer Size** in the Advanced Protocol Parameters section
  2. Create a new Service Name “emrep” on em12.example.com.
     1. Click the green "**+**" button at the top-left of the form to create a new Service Name entry
     2. Enter **emrep** as the Net Service Name and click the **Next** button
     3. Highlight **TCP/IP (Internet Protocol)** and click the **Next** button
     4. Enter **em12.example.com** for the Host Name
     5. Leave the port to its default value of **1521** and click the **Next** button
     6. Enter **emrep.example.com** as the Service Name and click the **Next** button
     7. Click the **Finish** button
  3. Click **File** > **Save Network Configuration** from the menu.
  4. Do not exit the Oracle Net Manager utility. Open a terminal window and use the SSH client to connect to host01 as the oracle OS user. Enter oracle when you are prompted for the password.

$ **ssh -X oracle@host01**

oracle@host01's password: **oracle**

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* 1. Use the oraenv utility to set the environment variables for the boston instance.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [oracle] ? **boston**

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

* 1. Navigate to the $ORACLE\_HOME/network/admin directory and examine the contents of the sqlnet.ora and tnsnames.ora network configuration files verifying the changes made.

[oracle@host01]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host01]$ **cat sqlnet.ora**

# sqlnet.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/sqlnet.ora # Generated by Oracle configuration tools.

NAMES.DIRECTORY\_PATH= (TNSNAMES, HOSTNAME, EZCONNECT)

ADR\_BASE = /u01/app/oracle

[oracle@host01]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

LONDONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host04.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVICE\_NAME = londonFS.example.com)

)

)

BOSTONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host02.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVICE\_NAME = bostonFS.example.com)

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)

)

EMREP = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = em12.example.com)(PORT

= 1521))

)

(CONNECT\_DATA =

(SERVICE\_NAME = emrep.example.com)

)

)

BOSTON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

PRMY =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVICE\_NAME = prmy.example.com)

)

)

LONDON2 = (DESCRIPTION =

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(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVICE\_NAME = london2.example.com)

)

)

LONDON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(SDU = 32767) (CONNECT\_DATA =

(SERVICE\_NAME = london.example.com)

)

)

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# Practice 3-2: Modifying the listener.ora Configuration File

### Overview

In this practice you will modify the listener.ora configuration files on each server in the Oracle Data Guard environment using the Graphical Oracle Net Manager utility. You will create static entries for the “boston” , “london” , and “london2” service names. A static entry is required for RMAN to make a connection after shutting down the instance during physical or logical standby database creation. You will also create entries that are required later in the course for Data Guard Broker operations. The following chart summarizes the entries that need to be created on each server host respectively:

|  |  |  |  |
| --- | --- | --- | --- |
| **Host** | **Global Database Name** | **Oracle Home Directory** | **SID** |
| host01 | boston.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | boston |
| host01 | boston\_DGMGRL.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | boston |
| host02 | bostonFS.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | bostonFS |
| host02 | bostonFS\_DGMGRL.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | bostonFS |
| host03 | london.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | london |
| host03 | london\_DGMGRL.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | london |
| host03 | london2.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | london2 |
| host03 | london2\_DGMGRL.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | london2 |
| host04 | londonFS.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | londonFS |
| host04 | londonFS\_DGMGRL.example.com | /u01/app/oracle/product/12.1.0/dbhome\_1 | londonFS |

### Tasks

1. Using the Oracle Net Manager utility that is still open from practice 3-1 for host01, set the Send Buffer Size and Receive Buffer Size advanced protocol parameters to match the sizes entered in the tnsnames.ora configuration.
   1. Expand the **Listeners** menu tree item
   2. Highlight the **LISTENER** entry
   3. Under the **Listening Locations**, **Address 1** section, click the **Show Advanced** button for the **TCP/IP** protocol entry
   4. Enter **65535** for both the **Send Buffer Size** and the **Receive Buffer Size** (**Note:** The documentation recommends a minimum value of 10485760, but the Oracle Net Manager utility currently limits this value to 65535.)
2. Create static listener entries for host01 identified by the table in the overview section of this practice.
   1. Under the Listening locations drop down menu, select the **Database Services** entry. Currently no database services are explicitly configured for this listener.
   2. Click the **Add Database** button. Enter **boston.example.com** for the Global Database Name and **boston** for the SID. The Oracle Home Directory should default to the correct location.

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* 1. Click the **Add Database** button. Enter **boston\_DGMGRL.example.com** for the Global Database Name and **boston** for the SID. The Oracle Home Directory should default to the correct location.

1. Click **File** > **Save Network Configuration** from the menu.
2. Do not exit the Oracle Net Manager utility. If you closed the terminal window from the previous practice, open a terminal window and use the SSH client to connect to host01 as the oracle OS user. Enter oracle when you are prompted for the password.

$ **ssh -X oracle@host01**

oracle@host01's password: **oracle**

1. Use the oraenv utility to set the environment variables for the boston instance.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [oracle] ? **boston**

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

1. Navigate to the $ORACLE\_HOME/network/admin directory and examine the contents of the listener.ora network configuration file verifying the changes made.

[oracle@host01]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host01]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

SID\_LIST\_LISTENER = (SID\_LIST =

(SID\_DESC =

(GLOBAL\_DBNAME = boston.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = boston)

)

(SID\_DESC =

(GLOBAL\_DBNAME = boston\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = boston)

)

)

LISTENER = (DESCRIPTION\_LIST =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 65535)(RECV\_BUF\_SIZE = 65535))

)

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(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))

)

)

ADR\_BASE\_LISTENER = /u01/app/oracle

1. If the entries appear correct, then exit the Oracle Net Manager utility. Reload the modified configuration for the listener that is now running. If the listener is not running, then start it instead of reloading it.

[oracle@host01]$ **lsnrctl reload** *or* **lsnrctl start**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 06-JUN- 2013 06:08:02

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host01.example.com)(PO RT=1521)(SEND\_BUF\_SIZE=65535)(RECV\_BUF\_SIZE=65535)))

The command completed successfully

1. Copy the tnsnames.ora file and sqlnet.ora file to host02, host03 and host04 as the oracle user and place them into the same directory as they exist on host01. Do not copy the listener.ora file. Answer **yes** to continue and supply the password **oracle** if asked.

[oracle@host01]$ **scp tnsnames.ora host02:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

tnsnames.ora 100% 1934

1.9KB/s 00:00

[oracle@host01]$ **scp tnsnames.ora host03:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

tnsnames.ora 100% 1934

1.9KB/s 00:00

[oracle@host01]$ **scp tnsnames.ora host04:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

tnsnames.ora 100% 1934

1.9KB/s 00:00

[oracle@host01]$ **scp sqlnet.ora host02:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

sqlnet.ora 0.2KB/s

100%

202

00:00

[oracle@host01]$ **scp sqlnet.ora host03:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

sqlnet.ora 0.2KB/s

100%

202

00:00

[oracle@host01]$ **scp sqlnet.ora host04:/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin**

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sqlnet.ora 0.2KB/s

100% 202

00:00

1. Open a new terminal window and use the SSH client to connect to host02 as the oracle OS user. Enter oracle when you are prompted for the password. You can leave open the previous window to host01. You will soon need windows open to host01, host02, host03, and host04.

$ **ssh -X oracle@host02**

oracle@host02's password: **oracle**

1. Create an initial entry into the /etc/oratab file on host02 to facilitate setting environment variables.

[oracle@host02]$ **echo bostonFS:/u01/app/oracle/product/12.1.0/dbhome\_1:N >>**

**/etc/oratab**

1. Use the newly created entry to set the ORACLE\_BASE, ORACLE\_HOME, ORACLE\_SID, LD\_LIBRARY\_PATH, and PATH environment variables.

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

ORACLE\_SID = [oracle] ? **bostonFS**

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

1. Invoke the Oracle Net Manager utility on host02 to create a new listener and add static listener entries specific for that server.

[oracle@host02]$ **netmgr**

* 1. Expand the **Local** menu tree item. You can expand the Service Naming menu tree item if you want. You should see the entries that were manually copied from host01.
  2. Expand the **Listeners** menu tree item. There should be no entries under it at this time.
  3. **Highlight** the **Listeners** menu tree item and click the green plus (**+**) sign to create a new entry.
  4. Click the **OK** button to accept the default Listener Name of **LISTENER**.
  5. With **Listening Locations** in the drop down menu box, click **Add Address** button at the bottom of the window.
  6. Change the Host entry from 'host02' to '**host02.example.com**'.
  7. Under the Listening Locations, Address 1 section, click the **Show Advanced** button for the TCP/IP protocol entry
  8. Enter **65535** for both the **Send Buffer Size** and the **Receive Buffer Size** (**Note:** The documentation recommends a minimum value of 10485760, but the Oracle Net Manager utility currently limits this value to 65535.)

1. Create static listener entries for host02 identified by the table in the overview section of this practice.
   1. Under the **Listening locations** drop down menu, select the **Database Services** entry. Currently no database services are explicitly configured for this listener.
   2. Click the **Add Database** button. Enter **bostonFS.example.com** for the Global Database Name and **bostonFS** for the SID. The Oracle Home Directory should default to the correct location.

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* 1. Click the **Add Database** button. Enter **bostonFS\_DGMGRL.example.com** for the Global Database Name and **bostonFS** for the SID. The Oracle Home Directory should default to the correct location.

1. Click **File** > **Save Network Configuration** from the menu. Exit the Oracle Net Manager utility.
2. Start the listener.

[oracle@host02]$ **lsnrctl start**

…

Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=host02.example.com)(PO RT=1521)))

Services Summary...

Service "bostonFS.example.com" has 1 instance(s).

Instance "bostonFS", status UNKNOWN, has 1 handler(s) for this service...

Service "bostonFS\_DGMGRL.example.com" has 1 instance(s).

Instance "bostonFS", status UNKNOWN, has 1 handler(s) for this service...

The command completed successfully

1. Open a new terminal window and use the SSH client to connect to host03 as the oracle OS user. Enter oracle when you are prompted for the password. You can leave open the previous windows to host01 and host02 open.

$ **ssh -X oracle@host03**

oracle@host03's password: **oracle**

1. Create an initial entry into the /etc/oratab file on host03 to facilitate setting environment variables.

[oracle@host03]$ **echo london:/u01/app/oracle/product/12.1.0/dbhome\_1:N >> /etc/oratab**

[oracle@host03]$ **echo london2:/u01/app/oracle/product/12.1.0/dbhome\_1:N >> /etc/oratab**

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1. Use the newly created entry to set the ORACLE\_BASE, ORACLE\_HOME, ORACLE\_SID, LD\_LIBRARY\_PATH, and PATH environment variables.

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

ORACLE\_SID = [oracle] ? **london**

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

1. Invoke the Oracle Net Manager utility on host03 to create a new listener and add static listener entries specific for that server.

[oracle@host03]$ **netmgr**

* 1. Expand the **Local** menu tree item. You can expand the Service Naming menu tree item if you want. You should see the entries that were manually copied from host01.
  2. Expand the **Listeners** menu tree item. There should be no entries under it at this time.
  3. **Highlight** the **Listeners** menu tree item and click the green plus (**+**) sign to create a new entry.
  4. Click the **OK** button to accept the default Listener Name of **LISTENER**.
  5. With **Listening Locations** in the drop down menu box, click **Add Address** button at the bottom of the window.
  6. Change the Host entry from 'host03' to '**host03.example.com**'.
  7. Under the Listening Locations, Address 1 section, click the **Show Advanced** button for the TCP/IP protocol entry
  8. Enter **65535** for both the **Send Buffer Size** and the **Receive Buffer Size** (**Note:** The documentation recommends a minimum value of 10485760, but the Oracle Net Manager utility currently limits this value to 65535.)

1. Create static listener entries for host03 identified by the table in the overview section of this practice.
   1. Under the **Listening locations** drop down menu, select the **Database Services** entry. Currently no database services are explicitly configured for this listener.
   2. Click the **Add Database** button. Enter **london.example.com** for the Global Database Name and **london** for the SID. The Oracle Home Directory should default to the correct location.
   3. Click the **Add Database** button. Enter **london\_DGMGRL.example.com** for the Global Database Name and **london** for the SID. The Oracle Home Directory should default to the correct location.
   4. Click the **Add Database** button. Enter **london2.example.com** for the Global Database Name and **london2** for the SID. The Oracle Home Directory should default to the correct location.
   5. Click the **Add Database** button. Enter **london2\_DGMGRL.example.com** for the Global Database Name and **london2** for the SID. The Oracle Home Directory should default to the correct location.
2. Click **File** > **Save Network Configuration** from the menu. Exit the Oracle Net Manager utility.

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1. Start the listener.

[oracle@host03]$ **lsnrctl start**

…

Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=host03.example.com)(PO RT=1521)))

Services Summary...

Service "london.example.com" has 1 instance(s).

Instance "london", status UNKNOWN, has 1 handler(s) for this service...

Service "london2.example.com" has 1 instance(s).

Instance "london2", status UNKNOWN, has 1 handler(s) for this service...

Service "london2\_DGMGRL.example.com" has 1 instance(s).

Instance "london2", status UNKNOWN, has 1 handler(s) for this service...

Service "london\_DGMGRL.example.com" has 1 instance(s).

Instance "london", status UNKNOWN, has 1 handler(s) for this service...

The command completed successfully

1. Open a new terminal window and use the SSH client to connect to host04 as the oracle OS user. Enter oracle when you are prompted for the password. You can leave open the previous windows to host01, host02 and host03 open.

$ **ssh -X oracle@host04**

oracle@host04's password: **oracle**

1. Create an initial entry into the /etc/oratab file on host04 to facilitate setting environment variables.

[oracle@host04]$ **echo londonFS:/u01/app/oracle/product/12.1.0/dbhome\_1:N >>**

**/etc/oratab**

1. Use the newly created entry to set the ORACLE\_BASE, ORACLE\_HOME, ORACLE\_SID, LD\_LIBRARY\_PATH, and PATH environment variables.

[oracle@host04]$ **. oraenv**

ORACLE\_SID = [oracle] ? **londonFS**

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

1. Invoke the Oracle Net Manager utility on host03 to create a new listener and add static listener entries specific for that server.

[oracle@host04]$ **netmgr**

* 1. Expand the **Local** menu tree item. You can expand the Service Naming menu tree item if you want. You should see the entries that were manually copied from host01.
  2. Expand the **Listeners** menu tree item. There should be no entries under it at this time.

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* 1. **Highlight** the **Listeners** menu tree item and click the green plus (**+**) sign to create a new entry.
  2. Click the **OK** button to accept the default Listener Name of **LISTENER**.
  3. With Listening Locations in the drop down menu box, click **Add Address** button at the bottom of the window.
  4. Change the Host entry from 'host04' to '**host04.example.com**'.
  5. Under the Listening Locations, Address 1 section, click the **Show Advanced** button for the TCP/IP protocol entry
  6. Enter **65535** for both the **Send Buffer Size** and the **Receive Buffer Size** (**Note:** The documentation recommends a minimum value of 10485760, but the Oracle Net Manager utility currently limits this value to 65535.)

1. Create static listener entries for host04 identified by the table in the overview section of this practice.
   1. Under the **Listening locations** drop down menu, select the **Database Services** entry. Currently no database services are explicitly configured for this listener.
   2. Click the **Add Database** button. Enter **londonFS.example.com** for the Global Database Name and **londonFS** for the SID. The Oracle Home Directory should default to the correct location.
   3. Click the **Add Database** button. Enter **londonFS\_DGMGRL.example.com** for the Global Database Name and **londonFS** for the SID. The Oracle Home Directory should default to the correct location.
2. Click **File** > **Save Network Configuration** from the menu. Exit the Oracle Net Manager utility.
3. Start the listener.

[oracle@host04]$ **lsnrctl start**

…

Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=host04.example.com)(PO RT=1521)))

Services Summary...

Service "londonFS.example.com" has 1 instance(s).

Instance "londonFS", status UNKNOWN, has 1 handler(s) for this service...

Service "londonFS\_DGMGRL.example.com" has 1 instance(s).

Instance "londonFS", status UNKNOWN, has 1 handler(s) for this service...

The command completed successfully

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1. It is advised to keep one terminal window open to each of host01, host02, host03, and host04. If you should close any terminal windows, log into each host as the oracle account and set the environment variables using the oraenv utility as in previous tasks. For host03, you could open two distinct windows: one for london and the other for london2. The instance name to use with the oraenv utility depends on which host you are connected to according to the following chart:

|  |  |
| --- | --- |
| **Host** | **oraenv Utility Instance Name** |
| host01 | boston |
| host02 | bostonFS |
| host03 | london or london2 |
| host04 | londonFS |

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# Practice 3-3: Correcting Entries to Best Practice Values

### Overview

In this practice, you correct the limitations imposed by the Oracle Net Manager utility by manually editing the configuration files and entering best practice values for networking parameters.

### Tasks

1. On host01, navigate to the $ORACLE\_HOME/network/admin directory and use the vi utility to edit the tnsnames.ora network configuration file. Globally replace the SDU value to 65535.

[oracle@host01]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host01]$ **vi tnsnames.ora**

…

**:%s/SDU = 32767/SDU = 65535/g**

6 substitutions on 6 lines

**:wq!**

1. Examine the contents of the tnsnames.ora network configuration file and verify the changes made.

[oracle@host01]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

LONDONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host04.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = londonFS.example.com)

)

)

BOSTONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host02.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

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)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = bostonFS.example.com)

)

)

EMREP = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = em12.example.com)(PORT

= 1521))

)

(CONNECT\_DATA =

(SERVICE\_NAME = emrep.example.com)

)

)

BOSTON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

PRMY =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = prmy.example.com)

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)

) LONDON2 =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london2.example.com)

)

)

LONDON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london.example.com)

)

)

1. Use the vi utility to edit the listener.ora network configuration file. Globally replace both the SEND\_BUF\_SIZE and RECV\_BUF\_SIZE parameter values to 10485760.

[oracle@host01]$ **vi listener.ora**

…

**:%s/BUF\_SIZE = 65535/BUF\_SIZE = 10485760/g**

**:wq!**

1. Examine the contents of the listener.ora network configuration file and verify the changes made.

[oracle@host01]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

SID\_LIST\_LISTENER = (SID\_LIST =

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(SID\_DESC =

(GLOBAL\_DBNAME = boston.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = boston)

)

(SID\_DESC =

(GLOBAL\_DBNAME = boston\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = boston)

)

)

LISTENER = (DESCRIPTION\_LIST =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))

)

)

ADR\_BASE\_LISTENER = /u01/app/oracle

1. Reload the modified configuration to the Listener to allow the changes to take effect.

[oracle@host01]$ **lsnrctl reload**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 05-JUN- 2013 01:07:23

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host01.example.com)(PO RT=1521)(**SEND\_BUF\_SIZE=10485760**)(**RECV\_BUF\_SIZE=10485760**)))

The command completed successfully

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1. On host02, navigate to the $ORACLE\_HOME/network/admin directory and use the vi utility to edit the tnsnames.ora network configuration file. Globally replace the SDU value to 65535.

[oracle@host02]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host02]$ **vi tnsnames.ora**

…

**:%s/SDU = 32767/SDU = 65535/g**

6 substitutions on 6 lines

**:wq!**

1. Examine the contents of the tnsnames.ora network configuration file and verify the changes made.

[oracle@host02]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

LONDONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host04.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = londonFS.example.com)

)

)

BOSTONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host02.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = bostonFS.example.com)

)

)

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EMREP = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = em12.example.com)(PORT

= 1521))

)

(CONNECT\_DATA =

(SERVICE\_NAME = emrep.example.com)

)

)

BOSTON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

PRMY =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = prmy.example.com)

)

)

LONDON2 = (DESCRIPTION =

(ADDRESS\_LIST =

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london2.example.com)

)

)

LONDON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london.example.com)

)

)

1. Use the vi utility to edit the listener.ora network configuration file. Globally replace both the SEND\_BUF\_SIZE and RECV\_BUF\_SIZE parameter values to 10485760.

[oracle@host02]$ **vi listener.ora**

…

**:%s/BUF\_SIZE = 65535/BUF\_SIZE = 10485760/g**

**:wq!**

1. Examine the contents of the listener.ora network configuration file and verify the changes made.

[oracle@host02]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

SID\_LIST\_LISTENER = (SID\_LIST =

(SID\_DESC =

(GLOBAL\_DBNAME = bostonFS.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = bostonFS)

)

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(SID\_DESC =

(GLOBAL\_DBNAME = bostonFS\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = bostonFS)

)

)

LISTENER = (DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = host02.example.com)(PORT

= 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

ADR\_BASE\_LISTENER = /u01/app/oracle

1. Reload the modified configuration to the Listener to allow the changes to take effect.

[oracle@host02]$ **lsnrctl reload**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 05-JUN- 2013 01:07:23

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host02.example.com)(PO RT=1521)(**SEND\_BUF\_SIZE=10485760**)(**RECV\_BUF\_SIZE=10485760**)))

The command completed successfully

1. On host03, navigate to the $ORACLE\_HOME/network/admin directory and use the vi utility to edit the tnsnames.ora network configuration file. Globally replace the SDU value to 65535.

[oracle@host03]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host03]$ **vi tnsnames.ora**

…

**:%s/SDU = 32767/SDU = 65535/g**

6 substitutions on 6 lines

**:wq!**

1. Examine the contents of the tnsnames.ora network configuration file and verify the changes made.

[oracle@host03]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

LONDONFS =

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(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host04.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = londonFS.example.com)

)

)

BOSTONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host02.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = bostonFS.example.com)

)

)

EMREP = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = em12.example.com)(PORT

= 1521))

)

(CONNECT\_DATA =

(SERVICE\_NAME = emrep.example.com)

)

)

BOSTON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

PRMY =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = prmy.example.com)

)

)

LONDON2 = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london2.example.com)

)

)

LONDON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

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(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london.example.com)

)

)

1. Use the vi utility to edit the listener.ora network configuration file. Globally replace both the SEND\_BUF\_SIZE and RECV\_BUF\_SIZE parameter values to 10485760.

[oracle@host03]$ **vi listener.ora**

…

**:%s/BUF\_SIZE = 65535/BUF\_SIZE = 10485760/g**

**:wq!**

1. Examine the contents of the listener.ora network configuration file and verify the changes made.

[oracle@host03]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

SID\_LIST\_LISTENER = (SID\_LIST =

(SID\_DESC =

(GLOBAL\_DBNAME = london.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = london)

)

(SID\_DESC =

(GLOBAL\_DBNAME = london\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = london)

)

(SID\_DESC =

(GLOBAL\_DBNAME = london2.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = london2)

)

(SID\_DESC =

(GLOBAL\_DBNAME = london2\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = london2)

)

)

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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LISTENER = (DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = host03.example.com)(PORT

= 1521)(SEND\_SDU = 10485760)(RECV\_SDU = 10485760))

)

ADR\_BASE\_LISTENER = /u01/app/oracle

1. Reload the modified configuration to the Listener to allow the changes to take effect.

[oracle@host03]$ **lsnrctl reload**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 05-JUN- 2013 01:07:23

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host03.example.com)(PO RT=1521)(**SEND\_BUF\_SIZE=10485760**)(**RECV\_BUF\_SIZE=10485760**)))

The command completed successfully

1. On host04, navigate to the $ORACLE\_HOME/network/admin directory and use the vi utility to edit the tnsnames.ora network configuration file. Globally replace the SDU value to 65535.

[oracle@host04]$ **cd $ORACLE\_HOME/network/admin**

[oracle@host04]$ **vi tnsnames.ora**

…

**:%s/SDU = 32767/SDU = 65535/g**

6 substitutions on 6 lines

**:wq!**

1. Examine the contents of the tnsnames.ora network configuration file and verify the changes made.

[oracle@host04]$ **cat tnsnames.ora**

# tnsnames.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/tnsnames.o ra

# Generated by Oracle configuration tools.

LONDONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host04.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = londonFS.example.com)

)

)

BOSTONFS = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host02.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = bostonFS.example.com)

)

)

EMREP = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = em12.example.com)(PORT

= 1521))

)

(CONNECT\_DATA =

(SERVICE\_NAME = emrep.example.com)

)

)

BOSTON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = boston.example.com)

)

)

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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PRMY =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host01.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = prmy.example.com)

)

) LONDON2 =

(DESCRIPTION = (ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london2.example.com)

)

)

LONDON = (DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST =

host03.example.com)(PORT = 1521)(SEND\_BUF\_SIZE = 10485760)(RECV\_BUF\_SIZE = 10485760))

)

(**SDU = 65535**) (CONNECT\_DATA =

(SERVICE\_NAME = london.example.com)

)

)

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1. Use the vi utility to edit the listener.ora network configuration file. Globally replace both the SEND\_BUF\_SIZE and RECV\_BUF\_SIZE parameter values to 10485760.

[oracle@host04]$ **vi listener.ora**

…

**:%s/BUF\_SIZE = 65535/BUF\_SIZE = 10485760/g**

**:wq!**

1. Examine the contents of the listener.ora network configuration file and verify the changes made.

[oracle@host04]$ **cat listener.ora**

# listener.ora Network Configuration File:

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

# Generated by Oracle configuration tools.

SID\_LIST\_LISTENER = (SID\_LIST =

(SID\_DESC =

(GLOBAL\_DBNAME = londonFS.example.com)

(ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = londonFS)

)

(SID\_DESC =

(GLOBAL\_DBNAME = londonFS\_DGMGRL.example.com) (ORACLE\_HOME = /u01/app/oracle/product/12.1.0/dbhome\_1) (SID\_NAME = londonFS)

)

)

LISTENER = (DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = host04.example.com)(PORT

= 1521)( **SEND\_BUF\_SIZE=10485760**)(**RECV\_BUF\_SIZE=10485760**))

)

ADR\_BASE\_LISTENER = /u01/app/oracle

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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1. Reload the modified configuration to the Listener to allow the changes to take effect.

[oracle@host04]$ **lsnrctl reload**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 05-JUN- 2013 01:07:23

Copyright (c) 1991, 2013, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host04.example.com)(PO RT=1521)(**SEND\_BUF\_SIZE=10485760**)(**RECV\_BUF\_SIZE=10485760**)))

The command completed successfully

**Note:** At this point, if the Oracle Net Manager utility is launched it will generate errors due to the manually increased values for SDU, SEND\_BUF\_SIZE, and RECV\_BUF\_SIZE. All future changes to the listener.ora, tnsnames.ora, and sqlnet.ora files will need to be done manually. This should be corrected with a patch when it is available. Oracle Enterprise Manager Cloud Control 12*c* is capable of editing the files using the increased best-practice values.

Practices for Lesson 3: Oracle Net Services in a Data Guard Environment

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Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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**Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands**

**Chapter 4**

# Practices for Lesson 4: Overview

### Practices Overview

In these practices, you will prepare host01 to become the primary database and host03 to become a physical standby database. You will use the RMAN utility to create the physical standby database and then verify its operation.

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

Chapter 4 - Page 2

# Practice 4-1: Prepare the Primary Database to Support Data Guard

### Overview

In this practice, you verify that the primary database is configured correctly to support a physical standby database.

### Tasks

1. On host01, invoke SQL\*Plus and connect as SYSDBA to your primary database (boston). Determine if FORCE LOGGING is enabled. If it is not enabled, enable FORCE LOGGING mode.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Mon Jun 10 21:09:45

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **SELECT force\_logging FROM v$database;**

FORCE\_LOGGING NO

SQL> **ALTER DATABASE FORCE LOGGING;**

Database altered.

SQL> **SELECT force\_logging FROM v$database;**

FORCE\_LOGGING YES

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

Chapter 4 - Page 3

1. Determine the number of online redo log groups and their current size. Create standby redo log groups with one member for each group using the same size as the existing online redo logs. You should create one more additional group than the number you have for online redo log groups. Verify creation of the standby redo logs.

SQL> **select group#,bytes from v$log;**

GROUP# BYTES

1 52428800

2 52428800

3 52428800

SQL> **alter database add standby logfile ('/u01/app/oracle/oradata/boston/stdbyredo01.log') size 50M;**

Database altered.

SQL> **alter database add standby logfile ('/u01/app/oracle/oradata/boston/stdbyredo02.log') size 50M;**

Database altered.

SQL> **alter database add standby logfile ('/u01/app/oracle/oradata/boston/stdbyredo03.log') size 50M;**

Database altered.

SQL> **alter database add standby logfile ('/u01/app/oracle/oradata/boston/stdbyredo04.log') size 50M;**

Database altered.

SQL> **select group#,bytes from v$log;**

GROUP# BYTES

1 52428800

2 52428800

3 52428800

SQL> **select group#,bytes from v$standby\_log;**

GROUP# BYTES

4 52428800

5 52428800

6 52428800

7 52428800

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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1. Define the first log archive destination to use the flash recovery area and enable it. Ensure that the changes are done both in memory and also stored the server parameter file. This location should be valid for any role and also valid for all types of log files.

SQL> **alter system set log\_archive\_dest\_1='location=USE\_DB\_RECOVERY\_FILE\_DEST valid\_for=(ALL\_LOGFILES,ALL\_ROLES) db\_unique\_name=boston' scope=both;**

System altered.

SQL> **alter system set log\_archive\_dest\_state\_1='enable' scope=both;**

System altered.

1. Increase the maximum number of archive processes to 4.

SQL> **alter system set log\_archive\_max\_processes=4 scope=both;**

System altered.

**Note:** The documentation suggests this parameter be set to a value of 10. We are using a reduced number in this lab environment to reduce overhead.

1. Define the log\_archive\_config parameter to include entries for: boston, bostonFS, london, londonFS, and london2. Only london is needed at this moment, but the others can be added now in preparation for upcoming practices.

SQL> **alter system set log\_archive\_config='dg\_config=(boston,bostonFS,london,londonFS,l ondon2)' scope=both;**

System altered.

1. Enable automatic standby file management so that operating system file additions and deletions on the primary database are replicated to the standby database. This is normally set on the standby database. For the primary database, this is set for role reversals.

SQL> **alter system set standby\_file\_management='auto' scope=both;**

System altered.

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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# Practice 4-2: Prepare Host and Create Physical Standby Database

### Overview

In this practice, you will prepare host03 to receive the physical standby database and create the physical standby database using RMAN.

### Tasks

1. Use a terminal window logged in as oracle to host03 to create the initial directories needed for a physical standby database. Since the primary database is using multi-tenant architecture, additional directories are needed.

[oracle@host03]$ **mkdir -p /u01/app/oracle/admin/london/adump** [oracle@host03]$ **mkdir -p /u01/app/oracle/oradata/london** [oracle@host03]$ **mkdir -p /u01/app/oracle/oradata/london/pdbseed** [oracle@host03]$ **mkdir -p /u01/app/oracle/oradata/london/dev1**

[oracle@host03]$ **mkdir -p**

**/u01/app/oracle/fast\_recovery\_area/london**

1. Create a starter initialization file on host03 for the london physical standby instance. The only two parameters required are DB\_NAME and DB\_DOMAIN.

[oracle@host03]$ **echo 'DB\_NAME=london' >**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/initlondon.ora**

[oracle@host03]$ **echo 'DB\_DOMAIN=example.com' >>**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/initlondon.ora**

1. Copy the password file from the primary host to the physical standby host. Rename the file accordingly.

[oracle@host03]$ **scp oracle@host01:/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwb oston /u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon**

1. Startup nomount the london standby instance on host03. This assumes that the terminal window you are using has previously set the environment variables to london. Exit SQL\*Plus when done.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 03:51:01

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

SQL> **startup nomount**

ORACLE instance started.

Total System Global Area 217157632 bytes Fixed Size 2286656 bytes

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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|  |  |  |
| --- | --- | --- |
| Variable Size | 159386560 | bytes |
| Database Buffers | 50331648 | bytes |
| Redo Buffers  SQL> **exit** | 5152768 | bytes |
| Disconnected from Oracle Database 12c Enterprise Edition Release  12.1.0.1.0 - 64bit Production  With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options | | |

1. Create a physical standby on host03 using the RMAN utility.

[oracle@host03]$ **rman target sys/oracle\_4U@boston auxiliary sys/oracle\_4U@london**

Recovery Manager: Release 12.1.0.1.0 - Production on Tue Jun 11 04:15:35 2013

Copyright (c) 1982, 2013, Oracle and/or its affiliates. All rights reserved.

connected to target database: BOSTON (DBID=2507595832) connected to auxiliary database: LONDON (not mounted)

RMAN> **run {**

#### allocate channel prmy1 type disk;

**allocate auxiliary channel stby1 type disk;**

#### duplicate target database for standby from active database spfile

**parameter\_value\_convert 'boston','london' set db\_unique\_name='london'**

#### set db\_file\_name\_convert='boston','london' set log\_file\_name\_convert='boston','london' set fal\_server='boston'

**nofilenamecheck;**

#### allocate auxiliary channel stby type disk;

**sql channel stby "alter database recover managed standby database disconnect"; }**

using target database control file instead of recovery catalog allocated channel: prmy1

channel prmy1: SID=105 device type=DISK

allocated channel: stby1

channel stby1: SID=20 device type=DISK

Starting Duplicate Db at 13-JUN-13

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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contents of Memory Script:

{

backup as copy reuse targetfile

'/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwboston' auxiliary format

'/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon' ; restore clone from service 'boston' spfile to

'/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/spfilelondon.ora';

sql clone "alter system set spfile= ''/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/spfilelondon.ora'' ";

}

executing Memory Script

Starting backup at 13-JUN-13 Finished backup at 13-JUN-13

Starting restore at 13-JUN-13

channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: restoring SPFILE

output file name=/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/spfilelondon.or a

channel stby1: restore complete, elapsed time: 00:00:01 Finished restore at 13-JUN-13

sql statement: alter system set spfile= ''/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/spfilelondon.ora''

contents of Memory Script:

{

sql clone "alter system set audit\_file\_dest = ''/u01/app/oracle/admin/london/adump'' comment= '''' scope=spfile";

sql clone "alter system set control\_files =

''/u01/app/oracle/oradata/london/control01.ctl'', ''/u01/app/oracle/fast\_recovery\_area/london/control02.ctl'' comment=

'''' scope=spfile";

sql clone "alter system set dispatchers = ''(PROTOCOL=TCP) (SERVICE=londonXDB)'' comment=

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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'''' scope=spfile";

sql clone "alter system set log\_archive\_dest\_1 =

''location=USE\_DB\_RECOVERY\_FILE\_DEST valid\_for=(ALL\_LOGFILES,ALL\_ROLES) db\_unique\_name=london'' comment=

'''' scope=spfile";

sql clone "alter system set db\_unique\_name = ''london'' comment=

'''' scope=spfile";

sql clone "alter system set db\_file\_name\_convert = ''boston'', ''london'' comment=

'''' scope=spfile";

sql clone "alter system set log\_file\_name\_convert = ''boston'', ''london'' comment=

'''' scope=spfile";

sql clone "alter system set fal\_server = ''boston'' comment=

'''' scope=spfile"; shutdown clone immediate; startup clone nomount;

}

executing Memory Script

sql statement: alter system set audit\_file\_dest = ''/u01/app/oracle/admin/london/adump'' comment= '''' scope=spfile

sql statement: alter system set control\_files = ''/u01/app/oracle/oradata/london/control01.ctl'', ''/u01/app/oracle/fast\_recovery\_area/london/control02.ctl'' comment= '''' scope=spfile

sql statement: alter system set dispatchers = ''(PROTOCOL=TCP) (SERVICE=londonXDB)'' comment= '''' scope=spfile

sql statement: alter system set log\_archive\_dest\_1 = ''location=USE\_DB\_RECOVERY\_FILE\_DEST valid\_for=(ALL\_LOGFILES,ALL\_ROLES) db\_unique\_name=london'' comment= '''' scope=spfile

sql statement: alter system set db\_unique\_name = ''london'' comment= '''' scope=spfile

sql statement: alter system set db\_file\_name\_convert = ''boston'', ''london'' comment= '''' scope=spfile

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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sql statement: alter system set log\_file\_name\_convert = ''boston'', ''london'' comment= '''' scope=spfile

sql statement: alter system set fal\_server = ''boston'' comment= '''' scope=spfile

Oracle instance shut down

connected to auxiliary database (not started) Oracle instance started

Total System Global Area 517763072 bytes

Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes allocated channel: stby1

channel stby1: SID=20 device type=DISK

contents of Memory Script:

{

restore clone from service 'boston' standby controlfile;

}

executing Memory Script

Starting restore at 13-JUN-13

channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: restoring control file

channel stby1: restore complete, elapsed time: 00:00:07 output file name=/u01/app/oracle/oradata/london/control01.ctl

output file name=/u01/app/oracle/fast\_recovery\_area/london/control02.ctl

Finished restore at 13-JUN-13

contents of Memory Script:

{

sql clone 'alter database mount standby database';

}

executing Memory Script

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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sql statement: alter database mount standby database

contents of Memory Script:

{

set newname for tempfile 1 to "/u01/app/oracle/oradata/london/temp01.dbf";

set newname for tempfile 2 to "/u01/app/oracle/oradata/london/pdbseed/pdbseed\_temp01.dbf";

set newname for tempfile 3 to "/u01/app/oracle/oradata/london/dev1/dev1\_temp01.dbf";

switch clone tempfile all;

set newname for datafile 1 to "/u01/app/oracle/oradata/london/system01.dbf";

set newname for datafile 3 to "/u01/app/oracle/oradata/london/sysaux01.dbf";

set newname for datafile 4 to "/u01/app/oracle/oradata/london/undotbs01.dbf";

set newname for datafile 5 to "/u01/app/oracle/oradata/london/pdbseed/system01.dbf";

set newname for datafile 6 to "/u01/app/oracle/oradata/london/users01.dbf";

set newname for datafile 7 to "/u01/app/oracle/oradata/london/pdbseed/sysaux01.dbf";

set newname for datafile 8 to "/u01/app/oracle/oradata/london/dev1/system01.dbf";

set newname for datafile 9 to "/u01/app/oracle/oradata/london/dev1/sysaux01.dbf";

set newname for datafile 10 to

"/u01/app/oracle/oradata/london/dev1/SAMPLE\_SCHEMA\_users01.dbf"; set newname for datafile 11 to

"/u01/app/oracle/oradata/london/dev1/example01.dbf"; restore

from service 'boston' clone database

;

sql 'alter system archive log current';

}

executing Memory Script

executing command: SET NEWNAME

executing command: SET NEWNAME

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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executing command: SET NEWNAME

renamed tempfile 1 to /u01/app/oracle/oradata/london/temp01.dbf in control file

renamed tempfile 2 to

/u01/app/oracle/oradata/london/pdbseed/pdbseed\_temp01.dbf in control file

renamed tempfile 3 to

/u01/app/oracle/oradata/london/dev1/dev1\_temp01.dbf in control file

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

Starting restore at 13-JUN-13

channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00001 to

/u01/app/oracle/oradata/london/system01.dbf

channel stby1: restore complete, elapsed time: 00:01:05 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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channel stby1: restoring datafile 00003 to

/u01/app/oracle/oradata/london/sysaux01.dbf

channel stby1: restore complete, elapsed time: 00:01:25 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston

channel stby1: specifying datafile(s) to restore from backup set channel stby1: restoring datafile 00004 to

/u01/app/oracle/oradata/london/undotbs01.dbf

channel stby1: restore complete, elapsed time: 00:00:25 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00005 to

/u01/app/oracle/oradata/london/pdbseed/system01.dbf channel stby1: restore complete, elapsed time: 00:00:25 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00006 to

/u01/app/oracle/oradata/london/users01.dbf

channel stby1: restore complete, elapsed time: 00:00:01 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00007 to

/u01/app/oracle/oradata/london/pdbseed/sysaux01.dbf channel stby1: restore complete, elapsed time: 00:01:25 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00008 to

/u01/app/oracle/oradata/london/dev1/system01.dbf channel stby1: restore complete, elapsed time: 00:00:35 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00009 to

/u01/app/oracle/oradata/london/dev1/sysaux01.dbf channel stby1: restore complete, elapsed time: 00:01:15 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set channel stby1: restoring datafile 00010 to

/u01/app/oracle/oradata/london/dev1/SAMPLE\_SCHEMA\_users01.dbf

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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channel stby1: restore complete, elapsed time: 00:00:03 channel stby1: starting datafile backup set restore

channel stby1: using network backup set from service boston channel stby1: specifying datafile(s) to restore from backup set

channel stby1: restoring datafile 00011 to

/u01/app/oracle/oradata/london/dev1/example01.dbf channel stby1: restore complete, elapsed time: 00:00:35 Finished restore at 13-JUN-13

sql statement: alter system archive log current

contents of Memory Script:

{

switch clone datafile all;

}

executing Memory Script

datafile 1 switched to datafile copy

input datafile copy RECID=7 STAMP=818005339 file name=/u01/app/oracle/oradata/london/system01.dbf

datafile 3 switched to datafile copy

input datafile copy RECID=8 STAMP=818005339 file name=/u01/app/oracle/oradata/london/sysaux01.dbf

datafile 4 switched to datafile copy

input datafile copy RECID=9 STAMP=818005339 file name=/u01/app/oracle/oradata/london/undotbs01.dbf

datafile 5 switched to datafile copy

input datafile copy RECID=10 STAMP=818005339 file name=/u01/app/oracle/oradata/london/pdbseed/system01.dbf

datafile 6 switched to datafile copy

input datafile copy RECID=11 STAMP=818005339 file name=/u01/app/oracle/oradata/london/users01.dbf

datafile 7 switched to datafile copy

input datafile copy RECID=12 STAMP=818005340 file name=/u01/app/oracle/oradata/london/pdbseed/sysaux01.dbf

datafile 8 switched to datafile copy

input datafile copy RECID=13 STAMP=818005340 file name=/u01/app/oracle/oradata/london/dev1/system01.dbf

datafile 9 switched to datafile copy

input datafile copy RECID=14 STAMP=818005340 file name=/u01/app/oracle/oradata/london/dev1/sysaux01.dbf

datafile 10 switched to datafile copy

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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input datafile copy RECID=15 STAMP=818005340 file name=/u01/app/oracle/oradata/london/dev1/SAMPLE\_SCHEMA\_users01.d bf

datafile 11 switched to datafile copy

input datafile copy RECID=16 STAMP=818005340 file name=/u01/app/oracle/oradata/london/dev1/example01.dbf

Finished Duplicate Db at 13-JUN-13

allocated channel: stby

channel stby: SID=19 device type=DISK

sql statement: alter database recover managed standby database disconnect

released channel: prmy1 released channel: stby1 released channel: stby RMAN> **exit**

Recovery Manager complete.

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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# Practice 4-3: Start Redo Transport and Verify Operation

SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

69

1

### Overview

In this practice, you will start the redo transport from host01 to host03 and verify operation.

### Tasks

1. Use a terminal window for host01 logged in as oracle with the environment variables set to boston and start redo transport by defining log\_archive\_dest\_2 pointing to the physical standby database.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 06:28:00

2013

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Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **alter system set log\_archive\_dest\_2='SERVICE=london ASYNC REOPEN=15 valid\_for=(ONLINE\_LOGFILES,PRIMARY\_ROLE)**

**db\_unique\_name=london' scope=both;**

System altered.

1. Determine the last sequence number archived on the primary database (host01). You number may be different in lab.

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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1. Use a terminal window on host03 connected as oracle with the environment variables set to london. Start SQL\*Plus and determine the last sequence number of the physical standby instance.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 06:58:53

2013

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Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

69

1

1. Return to the terminal window of host01, and force a log switch to advance the online redo log sequence number. Verify the sequence number has increased.
2. Return to the terminal window of host03, and verify that the physical standby instance is receiving redo from the primary database instance

(host01) SQL> **alter system switch logfile;**

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

70

1

(host03) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

70

1

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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1. Exit SQL\*Plus on both host01 and host03.

SQL> **exit**

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

[oracle@host01] $

SQL> **exit**

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

[oracle@host03] $

Practices for Lesson 4: Creating a Physical Standby Database by Using SQL and RMAN Commands

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Practices for Lesson 5: Using Oracle Active Data Guard

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**Practices for Lesson 5: Using Oracle Active Data Guard**

**Chapter 5**

# Practices for Lesson 5: Overview

### Practices Overview

In these practices, you will enable Active Data Guard real-time query and verify its operation. You will also enable change tracking on the physical standby database and implement Far Sync into the current environment.

Practices for Lesson 5: Using Oracle Active Data Guard

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# Practice 5-1: Enable Active Data Guard Real-Time Query

### Overview

In this practice, you enable the Active Data Guard real-time query feature and verify its operation.

### Tasks

1. Use a terminal window logged in as oracle to host03 with the environment variables set for 'london' appropriately. Attempt to enable Active Data Guard real-time query by opening the physical standby database in read only mode.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 18:08:44

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **alter database open read only;**

alter database open read only

\*

ERROR at line 1:

ORA-10456: cannot open standby database; media recovery session may be in progress

1. Active Data Guard real-time query cannot be enabled while Redo Apply is active. Stop redo apply on the physical standby database and attempt to enable it again.

(host03) SQL> **alter database recover managed standby database cancel;**

Database altered.

(host03) SQL> **alter database open read only;**

Database altered.

1. Restart the Redo Apply process on the physical standby database.

(host03) SQL> **alter database recover managed standby database disconnect;**

Database altered.

1. This database is using the Oracle Multitenant option. The default operating system authentication method for the multitenant container database (CDB) is to the container root (CDB$ROOT). Data Guard environment operations are performed at the CDB level. Schema objects like the sample schemas exist in customer created pluggable databases (PDBs). Verify that the SQL\*Plus session is currently connected to the CDB$ROOT and that sample schemas do not exist in the root container. Two ways are illustrated to determine the

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current container name. The first technique uses the SQL\*Plus show commands. The second technique uses all SQL syntax. The HR.REGIONS table is part of the sample schemas, but should not exist in the root container.

(host03) SQL> **show con\_id**

CON\_ID 1

(host03) SQL> **show con\_name**

CON\_NAME CDB$ROOT

(host03) SQL> **SELECT sys\_context ('USERENV', 'CON\_NAME') FROM**

**dual;**

SYS\_CONTEXT('USERENV','CON\_NAME')

CDB$ROOT

(host03) SQL> **select \* from hr.regions;**

select \* from hr.regions

\*

ERROR at line 1:

ORA-00942: table or view does not exist

1. Determine the pluggable database name (PDB) that was used when creating the multitenant database in previous labs. Two different queries are shown that can provide this answer. There are more views available that also provide this information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CON\_ID |  | NAME |  | OPEN\_MODE |
| 1 |  | CDB$ROOT |  | READ ONLY |
| 2 |  | PDB$SEED |  | READ ONLY |
| 3 |  | ***DEV1*** |  | MOUNTED |

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(host03) SQL> **select con\_id, name, open\_mode from v$containers;**

(host03) SQL> **col pdb\_name format a15**

(host03) SQL> **select pdb\_id, pdb\_name, status from DBA\_PDBS;**

PDB\_ID PDB\_NAME STATUS

3 ***DEV1***

2 PDB$SEED

NORMAL

NORMAL

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1. Switch the SQL\*Plus session to the DEV1 pluggable database (PDB) and attempt to query the HR.REGIONS table again.

(host03) (CDB$ROOT) SQL> **ALTER SESSION SET CONTAINER = DEV1;**

Session altered.

(host03) (DEV1) SQL> **select \* from hr.regions;**

select \* from hr.regions

\*

ERROR at line 1:

ORA-01219: database or pluggable database not open: queries allowed on fixed tables or views only

**Note:** Even thought the 'london' physical standby database was opened read-only to enable Active Data Guard in step 2, this command was performed at the CDB level. It did not open each individual PDB. The output of step 5 shows that the PDB is currently mounted. Therefore, queries against fixed tables are not allowed and return errors.

1. Open the DEV1 PDB with the 'ALTER DATABASE OPEN' command and attempt to query the HR.REGIONS table again.

(host03) (DEV1) SQL> **alter database open;**

Database altered.

(host03) (DEV1) SQL> **select \* from hr.regions order by region\_id;**

REGION\_ID REGION\_NAME

1. Europe
2. Americas
3. Asia
4. Middle East and Africa
5. The 'ALTER DATABASE OPEN' command is normally used to open a database to the read- write mode. Use the query in step 5 to determine the open mode of the DEV1 PDB.

**Note:** Since the current container is DEV1 and not CDB$ROOT, the output is restricted to that of only the DEV1 PDB. Because the entire PDB is a physical standby database, the SQL statement to open the database is only allowed to open to the read only mode even though a normal read write mode was requested.

(host03) (DEV1) SQL> **select con\_id, name, open\_mode from v$containers;**

CON\_ID NAME

OPEN\_MODE

3 DEV1

READ ONLY

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1. Leave the above window open. Open a terminal window (if not already open) logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch SQL\*Plus and switch session to the DEV1 PDB of the primary database. Query the HR.REGIONS table.

[oracle@host01] **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 19:27:19

2013

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Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) (CDB$ROOT) SQL> **alter session set container = DEV1;**

Session altered.

(host01) (DEV1) SQL> **select \* from hr.regions order by region\_id;**

REGION\_ID REGION\_NAME

1. Europe
2. Americas
3. Asia
4. Middle East and Africa
5. Insert a new row into the HR.REGIONS table and commit the SQL statement.

(host01) (DEV1) SQL> **insert into hr.regions values (5,'Australia');**

1 row created.

SQL> **commit;**

Commit complete.

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1. Return to the SQL\*Plus session to the DEV1 PDB that is still open for the physical standby database on host03 and query the HR.REGIONS value. The new row is immediately available on the physical standby database for reporting applications after it was inserted on the primary database. This illustrates the real-time query capability of Active Data Guard.

(**host03**) (DEV1) SQL> **select \* from hr.regions order by region\_id;**

REGION\_ID REGION\_NAME

1. Europe
2. Americas
3. Asia
4. Middle East and Africa
5. *Australia*
6. Exit SQL\*Plus on host03 of the physical standby database. It is recommended to keep the terminal session open with the environment variables set appropriately.
7. Returning to the SQL\*Plus session on host01, attempt to perform a log switch on the primary database and observe the error message. This occurs because the session is connected to the DEV1 PDB and not the root container. This presents a challenge when using terminal session for a command line Data Guard environment due to hosts involved (host01,host02,host03,host04), operating system accounts (vncuser, root, oracle), environment variable settings (boston, bostonFS, london, londonFS), and now CDB vs. PDB connected sessions (CDB$ROOT, DEV1). Fictitious prompts have been added to these lab exercises to help the student know how they should be connected. These prompts do not appear in the actual labs.

(host01) (DEV1) SQL> **alter system switch logfile;**

alter system switch logfile

\*

ERROR at line 1:

ORA-65040: operation not allowed from within a pluggable database

**Note:** Remember that all Data Guard operations must be performed at the container root level (CDB$ROOT).

1. Exit SQL\*Plus on host01, leaving the window open for future practices.

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# Practice 5-2: Enable Change Tracking on the Physical Standby Database

### Overview

In this practice, you will enable the change tracking feature on host03 for the physical standby database and verify its usage.

### Tasks

1. Use a terminal window logged in as oracle to host03 with the environment variables set for 'london' appropriately. SQL\*Plus using operating system authentication connect by default in the lab environment to the root container. Enable change tracking using the file

/u01/app/oracle/oradata/london/rman\_change\_track.file.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 20:06:05

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **alter database enable block change tracking using file '/u01/app/oracle/oradata/london/rman\_change\_track.file';**

Database altered.

1. Verify that block change tracking is enabled, displaying the file name used and file size of the block change tracking file.
2. Exit SQL\*Plus on host03 of the physical standby database. It is recommended to keep the terminal session open with the environment variables set appropriately.

(host03) SQL> **select filename, status, bytes from v$block\_change\_tracking;**

FILENAME

STATUS

BYTES

/u01/app/oracle/oradata/london/rman\_change\_track.file

ENABLED 11599872

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# Practice 5-3: Add Far Sync to the Data Guard Environment

### Overview

In this practice, you will create a Far Sync instance (bostonFS) on host02 that is in close proximity to the primary database.

### Tasks

1. Use a terminal window for host01 logged in as oracle with the environment variables set to 'boston'. Use SQL\*Plus to create a text-based initialization parameter file named '/tmp/initbostonFS.ora' that contains a copy of all the current parameters for the primary database.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 21:27:25

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **create pfile='/tmp/initbostonFS.ora' from spfile;**

File created.

1. Create a Far Sync control file named '/tmp/bostonFS.ctl' on the primary database and exit SQL\*Plus when done.

(host01) SQL> **alter database create far sync instance controlfile as '/tmp/bostonFS.ctl';**

Database altered.

(host01) SQL> **exit**

1. Copy the primary password file to the /tmp directory.

[oracle@host01]$ **cp $ORACLE\_HOME/dbs/orapwboston /tmp**

1. Transfer the three files staged in the /tmp directory from host01 to host02 and place them into the /tmp directory on host02.

[oracle@host01]$ **scp /tmp/initbostonFS.ora oracle@host02:/tmp** initbostonFS.ora 100% 1416 1.4KB/s 00:00 [oracle@host01]$ **scp /tmp/bostonFS.ctl oracle@host02:/tmp** bostonFS.ctl 100% 18MB 17.7MB/s 00:00 [oracle@host01]$ **scp /tmp/orapwboston oracle@host02:/tmp**

orapwboston 100% 7680 7.5KB/s 00:00

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1. Use a terminal window for host02 logged in as oracle with the environment variables set to 'bostonFS'. Create the initial directories needed on the Far Sync server. These are the same directories that were created on the physical standby server host03 in practice 4-2.

[oracle@host02]$ **mkdir -p /u01/app/oracle/admin/bostonFS/adump**

[oracle@host02]$ **mkdir -p /u01/app/oracle/oradata/bostonFS**

[oracle@host02]$ **mkdir -p**

**/u01/app/oracle/oradata/bostonFS/pdbseed**

[oracle@host02]$ **mkdir -p /u01/app/oracle/oradata/bostonFS/dev1**

[oracle@host02]$ **mkdir -p**

**/u01/app/oracle/fast\_recovery\_area/bostonFS**

**Note:** Linux directory and file names are case sensitive. Throughout these labs, the names for Far Sync use the format bostonFS and londonFS for readability. The last 2 letters are in upper-case.

1. On host02, use the VI utility to edit the /tmp/initbostonFS.ora file. You will need to make changes to the initialization parameters to reflect the name change from 'boston' to 'bostonFS'. You will also need to make adjustments for control file name changes and directory name changes.

[oracle@host02]$ **vi /tmp/initbostonFS.ora**

* 1. Globally search and replace all occurrences of 'boston' with 'bostonFS'

**:%s/boston/bostonFS/g**

18 substitutions on 16 lines

* 1. Two of the substitutions from the global search and replace are incorrect and need to be reverted back to their original value. Continue editing the file to locate and correct db\_name and log\_archive\_config entries. Ask your instructor for assistance if you need help with VI syntax. Remember to always use the <ESC> key before starting a new VI command option.

\*.db\_name='**boston**'

\*.log\_archive\_config='dg\_config=(**boston**,**bostonFS**,london,londonFS

,london2)'

* 1. The entry for log\_archive\_dest\_2 uses the valid\_for option assuming it has the role of primary database. On the Far Sync, this needs to use the role of a standby database. Also the Far Sync should use SYNC communication to the physical standby environment. Correct the log\_archive\_dest\_2 parameter to the following value (Changes to make in bold):

\*.log\_archive\_dest\_2='SERVICE=london **SYNC** REOPEN=15 valid\_for=(**STANDBY\_LOGFILES**,**STANDBY\_ROLE**) db\_unique\_name=london'

* 1. The original control files are named control01.ctl and control02.ctl. We will rename these to bostonFS01.ctl and bostonFS02.ctl. This is for preference only since these files are not normal control files. Both changes can be made with the following global search and replace:

**:%s/control0/bostonFS0/g**

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* 1. Add the following new entries to the bottom of the file.

**\*.db\_unique\_name=bostonFS**

**\*.fal\_server=boston**

**\*.log\_file\_name\_convert='boston','bostonFS'**

* 1. Recheck all modifications and case sensitivity issues. If accurate, then save the changes made to the file.

**:wq!**

* 1. The complete edited file is listed below for reference. Bold entries indicate changes that were made.

[oracle@host02]$ **cat /tmp/initbostonFS.ora** bostonFS. data\_transfer\_cache\_size=0 bostonFS. db\_cache\_size=46137344 bostonFS. java\_pool\_size=12582912 bostonFS. large\_pool\_size=12582912

bostonFS. oracle\_base='/u01/app/oracle'#ORACLE\_BASE set from environment

bostonFS. pga\_aggregate\_target=209715200 bostonFS. sga\_target=310378496

bostonFS. shared\_io\_pool\_size=4194304 bostonFS. shared\_pool\_size=226492416 bostonFS. streams\_pool\_size=0

\*.audit\_file\_dest='/u01/app/oracle/admin/**bostonFS**/adump'

\*.audit\_trail='db'

\*.compatible='12.1.0.0.0'

\*.control\_files='/u01/app/oracle/oradata/**bostonFS**/**bostonFS01**.ctl ','/u01/app/oracle/fast\_recovery\_area/**bostonFS**/**bostonFS02**.ctl'

\*.db\_block\_size=8192

\*.db\_domain='example.com'

\*.db\_name='**boston**'

\*.db\_recovery\_file\_dest='/u01/app/oracle/fast\_recovery\_area'

\*.db\_recovery\_file\_dest\_size=10g

\*.diagnostic\_dest='/u01/app/oracle'

\*.dispatchers='(PROTOCOL=TCP) (SERVICE=**bostonFSXDB**)'

\*.enable\_pluggable\_database=true

\*.log\_archive\_config='dg\_config=(**boston**,**bostonFS**,london,londonFS

,london2)'

\*.log\_archive\_dest\_1='location=USE\_DB\_RECOVERY\_FILE\_DEST valid\_for=(ALL\_LOGFILES,ALL\_ROLES) db\_unique\_name=**bostonFS**'

\*.log\_archive\_dest\_2='SERVICE=london **SYNC** REOPEN=15 valid\_for=(**STANDBY\_LOGFILES,STANDBY\_ROLE**) db\_unique\_name=london'

\*.log\_archive\_dest\_state\_1='enable'

\*.log\_archive\_format='arch\_%t\_%s\_%r.log'

\*.log\_archive\_max\_processes=4

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\*.memory\_target=496m

\*.open\_cursors=300

\*.processes=300

\*.remote\_login\_passwordfile='EXCLUSIVE'

\*.standby\_file\_management='auto'

\*.undo\_tablespace='UNDOTBS1'

**\*.db\_unique\_name=bostonFS**

**\*.fal\_server=boston**

**\*.log\_file\_name\_convert='boston','bostonFS'**

1. Copy the /tmp/bostonFS.ctl Far Sync control file to the two destination directories used in the initialization parameter file. Rename the files to the correct name while copying them.

[oracle@host02]$ **cp /tmp/bostonFS.ctl**

**/u01/app/oracle/oradata/bostonFS/bostonFS01.ctl**

[oracle@host02]$ **cp /tmp/bostonFS.ctl**

**/u01/app/oracle/fast\_recovery\_area/bostonFS**/**bostonFS02**.**ctl**

1. Copy the password file staged into the /tmp directory to the default location of Far Sync instance. Rename the file appropriately while copying it.

[oracle@host02]$ **cp /tmp/orapwboston**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwbostonFS**

1. Verify that the environment variables are defined for 'bostonFS'. If they are not, then use the oraenv utility to set them if needed.

[oracle@host02]$ **set | grep ORA**

OLD\_ORACLE\_BASE=

ORABASE\_EXEC=/u01/app/oracle/product/12.1.0/dbhome\_1/bin/orabase ORACLE\_BASE=/u01/app/oracle ORACLE\_HOME=/u01/app/oracle/product/12.1.0/dbhome\_1 ORACLE\_SID=***bostonFS*** ORAHOME=/u01/app/oracle/product/12.1.0/dbhome\_1

ORASID=oracle

1. Use SQL\*Plus to create a binary server parameter file from the text parameter file. Create the server parameter file into the default directory.

[oracle@host02]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 22:41:21

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host02) SQL> **create spfile from pfile='/tmp/initbostonFS.ora';**

File created.

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1. Startup MOUNT the Far Sync instance.

(host02) SQL> **startup mount;**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

1. Use a terminal window for host01 logged in as oracle with the environment variables set to 'boston', the primary database. Launch SQL\*plus and examine the current value of log\_archive\_dest\_2.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 22:58:23

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **show parameter log\_archive\_dest\_2**

NAME TYPE VALUE

log\_archive\_dest\_2 string

SERVICE=london SYNC REOPEN=15

valid\_for=(ONLINE\_LOGFILES, PRIMARY\_ROLE)

db\_unique\_name=london

1. The primary is currently forwarding redo to the physical standby database. Alter the primary database to now forward redo to the Far Sync instance instead of the physical standby database. Be sure to make the corrections both in memory and written to the server parameter file.

(host01) SQL> **alter system set log\_archive\_dest\_2='SERVICE=bostonFS SYNC REOPEN=15 valid\_for=(ONLINE\_LOGFILES,PRIMARY\_ROLE)**

**db\_unique\_name=bostonFS' scope=both;**

System altered.

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1. Determine the most recently archived redo log on the primary database. Perform a log switch, and verify the next sequence number used.

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

165

1

(host01) SQL> **alter system switch logfile;**

System altered.

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

166

1

1. Use the previous SQL\*Plus session for host02 logged in as oracle with the environment variables set to 'bostonFS', the Far Sync. Verify that the last sequence number of the primary was received on the Far Sync.
2. Use a terminal window for host03 logged in as oracle with the environment variables set to 'london'. Launch SQL\*Plus and verify that the physical standby on host03 is receiving redo from the Far Sync on host02.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Thu Aug 22 01:22:50

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

166

1

(host02) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

166

1

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1. Exit all SQL\*Plus sessions from host01, host02, and host03. Leave the terminal sessions open with the environment variables set for each system.

(host01) SQL> **exit;**

(host02) SQL> **exit;**

(host03) SQL> **exit;**

1. Verify on the Far Sync server, host02, that the standby redo logs were automatically created.

[oracle@host02]$ **ls -la /u01/app/oracle/oradata/bostonFS/stdby\***

-rw-r----- 1 oracle oinstall 52429312 Aug 22 02:38

/u01/app/oracle/oradata/bostonFS/stdbyredo01.log

-rw-r----- 1 oracle oinstall 52429312 Aug 22 01:22

/u01/app/oracle/oradata/bostonFS/stdbyredo02.log

-rw-r----- 1 oracle oinstall 52429312 Aug 22 01:13

/u01/app/oracle/oradata/bostonFS/stdbyredo03.log

-rw-r----- 1 oracle oinstall 52429312 Aug 22 01:13

/u01/app/oracle/oradata/bostonFS/stdbyredo04.log

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# Practice 5-4: Add 2nd Far Sync to the Data Guard Environment

### Overview

In this practice, you will create an additional Far Sync instance (londonFS) on host04 that is in close proximity to the physical standby database. This will be used in future practices that perform role reversal. With a role reversal, the 'london' instance on host03 will become the primary database. It will need to forward redo to 'londonFS' Far Sync on host04.

### Tasks

1. In the practice, we copied a Far Sync control file, initialization parameter file, and password file to the /tmp directory on host02. We will start with these files and copy them to host04 since they were already edited for a Far Sync environment. Use a terminal window for host02 logged in as oracle with the environment variables set to 'bostonFS'. Copy the three files staged in /tmp to host04.

[oracle@host02]$ **scp /tmp/bostonFS.ctl oracle@host04:/tmp**

bostonFS.ctl 100% 18MB 17.7MB/s 00:00

[oracle@host02]$ **scp /tmp/initbostonFS.ora oracle@host04:/tmp**

initbostonFS.ora 100% 1586 1.6KB/s 00:00

[oracle@host02]$ **scp /tmp/orapwboston oracle@host04:/tmp**

orapwboston 100% 7680 7.5KB/s 00:00

1. Use a terminal window for host04 logged in as oracle with the environment variables set to 'londonFS'. Create the initial directories needed on the Far Sync server. These are the same directories that were created on the physical standby server host03 in practice 4-2.

[oracle@host04]$ **mkdir -p /u01/app/oracle/admin/londonFS/adump**

[oracle@host04]$ **mkdir -p /u01/app/oracle/oradata/londonFS**

[oracle@host04]$ **mkdir -p**

**/u01/app/oracle/oradata/londonFS/pdbseed**

[oracle@host04]$ **mkdir -p /u01/app/oracle/oradata/londonFS/dev1**

[oracle@host04]$ **mkdir -p**

**/u01/app/oracle/fast\_recovery\_area/londonFS**

**Note:** Linux directory and file names are case sensitive. Throughout these labs, the names for Far Sync use the format bostonFS and londonFS for readability. The last 2 letters are in upper-case.

1. Use a terminal window for host04 logged in as oracle with the environment variables set to 'londonFS'. Rename the /tmp/initbostonFS.ora file to

/tmp/initlondonFS.ora. You will need to make changes to the initialization parameters to reflect the name change from 'boston' to 'london'. You will also need to make adjustments for control file name changes and directory name changes.

[oracle@host04]$ **mv /tmp/initbostonFS.ora /tmp/initlondonFS.ora**

[oracle@host04]$ **vi /tmp/initlondonFS.ora**

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* 1. Globally search and replace all occurrences of 'boston' with 'london'

**:%s/boston/london/g**

24 substitutions on 19 lines

* 1. Three of the substitutions from the global search and replace are incorrect and need to be reverted back to their original value. Continue editing the file to locate and correct db\_name, log\_archive\_config, and log\_file\_name\_convert entries. Ask your instructor for assistance if you need help with VI syntax. Remember to always use the <ESC> key before starting a new VI command option.

\*.db\_name='**boston**'

\*.log\_archive\_config='dg\_config=(**boston**,**bostonFS**,london,londonFS

,london2)'

\*.log\_file\_name\_convert='**boston**','londonFS'

* 1. The entry for log\_archive\_dest\_2 is defined for a standby database role to ship redo to the 'london' service. If 'london' becomes the primary database, then the 'londonFS' Far Sync should ship redo to 'boston', which will become the standby database after role reversal. Correct the values for this parameter. Changes shown in bold.

\*.log\_archive\_dest\_2='SERVICE=**boston ASYNC** REOPEN=15 valid\_for=(STANDBY\_LOGFILES,STANDBY\_ROLE) db\_unique\_name=**boston**'

* 1. Recheck all modifications and case sensitivity issues. If accurate, then save the changes made to the file. Less changes were needed since we started with a modified file.

**:wq!**

* 1. The complete edited file is listed below for reference. Bold entries indicate changes that were made.

[oracle@host04]$ **cat /tmp/initlondonFS.ora londonFS**. data\_transfer\_cache\_size=0 **londonFS**. db\_cache\_size=46137344 **londonFS**. java\_pool\_size=12582912 **londonFS**. large\_pool\_size=12582912

**londonFS**. oracle\_base='/u01/app/oracle'#ORACLE\_BASE set from environment

**londonFS**. pga\_aggregate\_target=209715200 **londonFS**. sga\_target=310378496

**londonFS**. shared\_io\_pool\_size=4194304 **londonFS**. shared\_pool\_size=226492416

**londonFS**. streams\_pool\_size=0

\*.audit\_file\_dest='/u01/app/oracle/admin/**londonFS**/adump'

\*.audit\_trail='db'

\*.compatible='12.1.0.0.0'

\*.control\_files='/u01/app/oracle/oradata/**londonFS**/**londonFS01**.ctl ','/u01/app/oracle/fast\_recovery\_area/**londonFS**/**londonFS02**.ctl'

\*.db\_block\_size=8192

\*.db\_domain='example.com'

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\*.db\_name='**boston**'

\*.db\_recovery\_file\_dest='/u01/app/oracle/fast\_recovery\_area'

\*.db\_recovery\_file\_dest\_size=10g

\*.diagnostic\_dest='/u01/app/oracle'

\*.dispatchers='(PROTOCOL=TCP) (SERVICE=**londonFS**XDB)'

\*.enable\_pluggable\_database=true

\*.log\_archive\_config='dg\_config=(**boston,bostonFS,london,londonFS**

#### ,london2)'

\*.log\_archive\_dest\_1='location=USE\_DB\_RECOVERY\_FILE\_DEST valid\_for=(ALL\_LOGFILES,ALL\_ROLES) db\_unique\_name=**londonFS**'

\*.log\_archive\_dest\_2='SERVICE=**boston ASYNC** REOPEN=15 valid\_for=(STANDBY\_LOGFILES,STANDBY\_ROLE) db\_unique\_name=**boston**'

\*.log\_archive\_dest\_state\_1='enable'

\*.log\_archive\_format='arch\_%t\_%s\_%r.log'

\*.log\_archive\_max\_processes=4

\*.memory\_target=496m

\*.open\_cursors=300

\*.processes=300

\*.remote\_login\_passwordfile='EXCLUSIVE'

\*.standby\_file\_management='auto'

\*.undo\_tablespace='UNDOTBS1'

\*.db\_unique\_name=**londonFS**

\*.fal\_server=**london**

\*.log\_file\_name\_convert='**boston**','**londonFS**'

1. Copy the /tmp/bostonFS.ctl Far Sync control file to the two destination directories used in the initialization parameter file. Rename the files to the correct name while copying them.

[oracle@host04]$ **cp /tmp/bostonFS.ctl**

**/u01/app/oracle/oradata/londonFS/londonFS01.ctl**

[oracle@host04]$ **cp /tmp/bostonFS.ctl**

**/u01/app/oracle/fast\_recovery\_area/londonFS**/**londonFS02**.**ctl**

1. Copy the password file staged into the /tmp directory to the default location of Far Sync instance. Rename the file appropriately while copying it.

[oracle@host04]$ **cp /tmp/orapwboston**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondonFS**

1. Verify that the environment variables are defined for 'bostonFS'. If they are not, then use the oraenv utility to set them if needed.

[oracle@host04]$ **set | grep ORA**

OLD\_ORACLE\_BASE=

ORABASE\_EXEC=/u01/app/oracle/product/12.1.0/dbhome\_1/bin/orabase ORACLE\_BASE=/u01/app/oracle

ORACLE\_HOME=/u01/app/oracle/product/12.1.0/dbhome\_1

Practices for Lesson 5: Using Oracle Active Data Guard

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ORACLE\_SID=*londonFS* ORAHOME=/u01/app/oracle/product/12.1.0/dbhome\_1

ORASID=oracle

1. Use SQL\*Plus to create a binary server parameter file from the text parameter file. Create the server parameter file into the default directory.

[oracle@host04]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 22:41:21

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host04) SQL> **create spfile from pfile='/tmp/initlondonFS.ora';**

File created.

1. Startup MOUNT the Far Sync instance. Leave SQL\*Plus session open when done.

(host04) SQL> **startup mount;**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

(host04) SQL> **exit;**

1. Use a terminal window for host03 logged in as oracle with the environment variables set to 'london', the physical standby database. Launch SQL\*plus and examine the current value of log\_archive\_dest\_2.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Aug 21 22:58:23

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **show parameter log\_archive\_dest\_2**

NAME TYPE VALUE

log\_archive\_dest\_2 string

Practices for Lesson 5: Using Oracle Active Data Guard

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1. The log\_archive\_dest\_2 parameter of the 'london' physical standby instance is not currently defined because it is a terminal destination. After role reversals, it would become the primary database. At that time, it should forward redo to the 'londonFS' Far Sync. Modify the log\_archive\_dest\_2 parameter so that it forwards redo accordingly.

(host03) SQL> **alter system set log\_archive\_dest\_2='SERVICE=londonFS SYNC REOPEN=15 valid\_for=(ONLINE\_LOGFILES,PRIMARY\_ROLE)**

**db\_unique\_name=londonFS' scope=both;**

System altered.

**Note:** At this point in the labs, the 'londonFS' Far Sync has been started, but it is not currently used. It will be tested after switchover exercises are performed in future labs.

1. Exit all SQL\*Plus sessions from host01, host02, host03, and host04 if they are still open. Leave the terminal sessions open with the environment variables set for each system.

(host01) SQL> **exit;** (host02) SQL> **exit;** (host03) SQL> **exit;**

(host04) SQL> **exit;**

Practices for Lesson 5: Using Oracle Active Data Guard

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Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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**Practices for Lesson 6: Creating and Managing a Snapshot Standby Database**

**Chapter 6**

# Practices for Lesson 6: Overview

### Practices Overview

In these practices, you will convert the physical standby database to a snapshot database and open it for read-write operations. You will create new schema objects in the database to verify the success of creating the snapshot. Finally, you will convert it back into a physical standby database, discarding the schema objects that were created.

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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# Practice 6-1: Convert Physical Standby to a Snapshot Standby

### Overview

In this practice, you will convert the 'london' physical standby database to a snapshot standby database.

### Tasks

1. Use a terminal window logged in as oracle to host03 with the environment variables set for 'london' appropriately. Launch SQL\*Plus and verify that the current database role is physical standby.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Thu Aug 22 03:45:30

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **select database\_role from v$database;**

DATABASE\_ROLE

PHYSICAL STANDBY

1. Verify that flashback database is turned off, and show the default value for the flashback retention target.
2. Display the values for the two initialization parameters that define the Fast Recovery Area.

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON NO

(host03) SQL> **show parameter DB\_FLASHBACK\_RETENTION\_TARGET**

NAME TYPE VALUE

db\_flashback\_retention\_target

integer

1440

(host03) SQL> **show parameter DB\_RECOVERY\_FILE\_DEST**

NAME TYPE VALUE

db\_recovery\_file\_dest

string

/u01/app/oracle/fast\_recovery\_area

db\_recovery\_file\_dest\_size big integer 10G

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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1. Display the current file types, number of files for each type, and percent of space utilization per file type for the Fast Recovery Area.

(host03) SQL> **select file\_type,number\_of\_files,percent\_space\_used from v$recovery\_area\_usage;**

AUXILIARY DATAFILE COPY

0

0

8 rows selected.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FILE\_TYPE |  |  | NUMBER\_OF\_FILES | PERCENT\_SPACE\_USED |
| CONTROL FILE |  |  | 0 | 0 |
| REDO LOG |  |  | 0 | 0 |
| ARCHIVED LOG |  |  |  | 4 .15 |
| BACKUP PIECE |  |  | 1 | .17 |
| IMAGE COPY |  |  | 0 | 0 |
| FLASHBACK LOG |  |  | 0 | 0 |
| FOREIGN ARCHIVED | LOG |  | 0 | 0 |

1. Attempt to convert the physical standby database to a snapshot standby database.

(host03) SQL> **alter database convert to snapshot standby;**

alter database convert to snapshot standby

\*

ERROR at line 1:

ORA-38784: Cannot create restore point 'SNAPSHOT\_STANDBY\_REQUIRED\_08/22/2013

03:57:13'.

ORA-01153: an incompatible media recovery is active

1. Cancel redo apply on the physical standby database and reattempt to convert the physical standby database to a snapshot standby database.

(host03) SQL> **alter database recover managed standby database cancel;**

Database altered.

(host03) SQL> **alter database convert to snapshot standby;**

Database altered.

1. Display the current database role.

(host03) SQL> **select database\_role from v$database;**

DATABASE\_ROLE

SNAPSHOT STANDBY

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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1. Verify that flashback database was automatically enabled when the physical standby was converted to a snapshot standby.

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON

RESTORE POINT ONLY

1. Display the name of the guaranteed restore point that was created and its current storage size.
2. Display the current open mode for the snapshot standby.

(**host03**) SQL> **select open\_mode from v$database;**

OPEN\_MODE

MOUNTED

(host03) SQL> **select name, storage\_size from v$restore\_point;**

NAME STORAGE\_SIZE

SNAPSHOT\_STANDBY\_REQUIRED\_08/22/2013 03:59:36

52428800

1. Verify that a flashback log was automatically created in the Recovery Area.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FILE\_TYPE |  |  | NUMBER\_OF\_FILES |  | PERCENT\_SPACE\_USED |
| CONTROL FILE |  |  | 0 |  | 0 |
| REDO LOG |  |  | 0 |  | 0 |
| ARCHIVED LOG |  |  | 4 |  | .15 |
| BACKUP PIECE |  |  | 1 |  | .17 |
| IMAGE COPY |  |  | 0 |  | 0 |
| ***FLASHBACK LOG*** |  |  | ***2*** |  | ***.98*** |
| FOREIGN ARCHIVED | LOG |  | 0 |  | 0 |

1. Attempt to convert the snapshot standby back to a physical standby.

(**host03**) SQL> **alter database convert to physical standby;**

alter database convert to physical standby

\*

ERROR at line 1:

ORA-16433: The database or pluggable database must be opened in read/write

mode.

(host03) SQL> **select file\_type, number\_of\_files, percent\_space\_used from v$recovery\_area\_usage;**

AUXILIARY DATAFILE COPY

0

0

8 rows selected.

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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**Note:** Even though the command in step 6 succeeded in converting the physical standby into a snapshot standby, it must be opened into read-write mode at least one time before you can reverse the operation back to a physical standby. The purpose of this example is to show what happens if you changed your mind and wanted to convert back to a physical standby without proceeding.

1. Open the snapshot database and verify that it has been opened in the read-write mode.

(host03) SQL> **alter database open;**

Database altered.

(host03) SQL> **select open\_mode from v$database;**

OPEN\_MODE

READ WRITE

1. Switch the container to the DEV1 PDB for the session. Even though the container is open, the DEV1 PDB is mounted. Open the DEV1 PDB, and create a miscellaneous table. Insert 1 row into the table and commit the result. Return to the root container when done.

(host03) SQL> **alter session set container = DEV1;**

Session altered.

(host03) SQL> **alter database open;**

Database altered.

(host03) SQL> **create table misc1 (x varchar2(50) );**

Table created.

(host03) SQL> **insert into misc1 values ('Test Row');**

1 row created.

(host03) SQL> **commit;**

Commit complete.

(host03) SQL> **alter session set container = CDB$ROOT;**

Session altered.

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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1. In step 6, managed recovery was stopped for the snapshot database. Use a terminal window logged in as oracle to host01 to with the environment variables set for 'boston' appropriately. Determine the last archived redo log for the primary database and perform a log switch. Exit SQL\*Plus when done.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Thu Aug 22 04:27:34

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

175

1

(host01) SQL> **alter system switch logfile;**

System altered.

(host01) SQL> **exit;**

(host03) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

176

1

1. Return to the SQL\*Plus session on host03 and verify that the snapshot standby is still receiving redo from the primary database, forwarded to the Far Sync, and then to the snapshot standby. The sequence number should be the next one after the number displayed on the primary database in the previous step.

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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# Practice 6-2: Convert Snapshot Standby Back to Physical Standby

### Overview

In this practice, you convert the snapshot standby back into a physical standby database.

### Tasks

1. Attempt to convert the snapshot standby back into a physical standby.

(host03) SQL> **alter database convert to physical standby;**

alter database convert to physical standby

\*

ERROR at line 1:

ORA-01126: database must be mounted in this instance and not open in any

Instance

1. Shutdown the snapshot standby and start it back up in the MOUNT mode.

(host03) SQL> **shutdown immediate;**

Database closed. Database dismounted.

ORACLE instance shut down.

SQL> **startup mount;**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes

Database mounted.

1. Reattempt to convert the snapshot standby back into a physical standby.

(host03) SQL> **alter database convert to physical standby;**

Database altered.

1. Verify that flashback has been turned off, and the flashback log was deleted freeing up space in the flash recovery area.

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON NO

(host03) SQL> **select file\_type,number\_of\_files,percent\_space\_used from v$recovery\_area\_usage;**

FILE\_TYPE NUMBER\_OF\_FILES PERCENT\_SPACE\_USED

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CONTROL FILE |  |  | 0 |  | 0 |
| REDO LOG |  |  | 0 |  | 0 |
| ARCHIVED LOG |  |  | 5 |  | .19 |
| BACKUP PIECE |  |  | 1 |  | .17 |
| IMAGE COPY |  |  | 0 |  | 0 |
| ***FLASHBACK LOG*** |  |  | ***0*** |  | ***0*** |
| FOREIGN ARCHIVED | LOG |  | 0 |  | 0 |

1. Open the container database to enable Active Data Guard, and then switch the session to the DEV1 pluggable database. Open the DEV1 PDB.

(host03) SQL> **alter database open;**

Database altered.

(host03) SQL> **alter session set container = DEV1;**

Session altered.

(host03) (DEV1) SQL> **alter database open;**

Database altered.

AUXILIARY DATAFILE COPY

0

0

1. Attempt to query the MISC1 table that was created in Practice 6-1 step 14, and verify that the table no longer exists after converting the snapshot standby back into a physical standby database.

(host03) (DEV1) SQL> **select \* from misc1;**

select \* from misc1

\* ERROR at line 1:

ORA-00942: table or view does not exist

(host03) (DEV1) SQL> **select table\_name from dba\_tables where table\_name like 'MISC%';**

no rows selected

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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1. Return the session back to the container root. Shut down the physical standby to disable Active Data Guard. Start in back up in the MOUNT state and restart Redo Apply.

(host03) SQL> **alter session set container = CDB$ROOT;**

Session altered.

(host03) SQL> **shutdown immediate;**

Database closed. Database dismounted.

ORACLE instance shut down.

(host03) SQL> **startup mount;**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

(host03) SQL> **alter database recover managed standby database disconnect;**

Database altered.

1. Exit SQL\*Plus on any host machine in which it is open. Do not close down the terminal sessions.

(host03) SQL> **exit;**

Practices for Lesson 6: Creating and Managing a Snapshot Standby Database

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Practices for Lesson 7: Creating a Logical Standby Database

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**Practices for Lesson 7: Creating a Logical Standby Database**

**Chapter 7**

Practices for Lesson 7: Creating a Logical Standby Database

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**Practices for Lesson 7: Overview**

**Practices Overview**

In these practices, you will prepare host03 to create a logical standby database.

You will use the RMAN utility to create the physical standby database and then verify its operation.

# Practice 7-1: Identify Unsupported Objects for Logical Standbys

### Overview

In this practice, you will examine the primary database to determine which objects will not be supported in a logical standby.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Start SQL\*Plus and verify that all pluggable databases are open for queries. If any pluggable database is mounted or shutdown, the queries that follow this step will not return complete results.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 03:51:01

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host01) SQL> **select con\_id, name, open\_mode from v$containers;**

CON\_ID NAME OPEN\_MODE

1. CDB$ROOT
2. PDB$SEED
3. DEV1

READ WRITE

READ ONLY READ WRITE

1. Find all tables across all PDBs without unique logical identifiers in the primary database. This query will take a few minutes to run.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CON\_ID |  | OWNER |  | TABLE\_NAME |
| 1 |  | APEX\_040200 |  | WWV\_FLOW\_BANNER |
| 1 |  | APEX\_040200 |  | APEX$\_WS\_WEBPG\_SECTION\_HISTORY |
| 2 |  | APEX\_040200 |  | WWV\_FLOW\_BANNER |
| 2 |  | APEX\_040200 |  | APEX$\_WS\_WEBPG\_SECTION\_HISTORY |
| 3 |  | APEX\_040200 |  | WWV\_FLOW\_BANNER |
| 3 |  | APEX\_040200 |  | APEX$\_WS\_WEBPG\_SECTION\_HISTORY |

**Note:** This query differs from the one listed in the product documentation. It has been modified to examine schema objects across all PDBs. We can ignore the APEX user, since we will not be using that product in class. The normal response to rows found by the above

(host01) SQL> **SELECT CON\_ID, OWNER, TABLE\_NAME FROM CDB\_LOGSTDBY\_NOT\_UNIQUE WHERE (CON\_ID, OWNER, TABLE\_NAME) NOT IN (SELECT DISTINCT CON\_ID, OWNER, TABLE\_NAME FROM CDB\_LOGSTDBY\_UNSUPPORTED) AND BAD\_COLUMN = 'Y';**

6 rows selected.

Practices for Lesson 7: Creating a Logical Standby Database

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query would be to create disabled 'rely' primary constraints, or to have SQL Apply skip changes made to the tables identified.

1. Identify the internal schemas that ship with the Oracle Database. Any user-defined table created into these schemas will not be replicated on the logical standby database. Also, those user-defined tables will not show up in the DBA\_LOGSTDBY\_UNSUPPORTED or CDB\_LOGSTDBY\_UNSUPPORTED views of step 4, even though they are unsupported.

(host01) SQL> **SELECT CON\_ID, OWNER FROM CDB\_LOGSTDBY\_SKIP WHERE STATEMENT\_OPT = 'INTERNAL SCHEMA' ORDER BY CON\_ID, OWNER;**

…

3 OLAPSYS

3 ORACLE\_OCM

3 ORDDATA

3 ORDPLUGINS CON\_ID OWNER

3 ORDSYS

3 OUTLN

3 SI\_INFORMTN\_SCHEMA

3 SYS

3 SYSBACKUP

3 SYSDG

3 SYSKM

3 SYSTEM

3 WMSYS

3 XDB

3 XS$NULL

88 rows selected.

**Note:** This query differs from the one listed in the product documentation. It has been modified to examine schema objects across all PDBs. The PDB DEV1 contains one additional internal schema not found in the CDB$ROOT or PDB$SEED containers. It is the BI schema.

1. Identify tables that do not belong to internal schemas and that will not be maintained by SQL Apply because of unsupported data types.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (host01) SQL> **SELECT DISTINCT CON\_ID,OWNER,TABLE\_NAME FROM CDB\_LOGSTDBY\_UNSUPPORTED ORDER BY OWNER,TABLE\_NAME;** | | | | |
| CON\_ID |  | OWNER |  | TABLE\_NAME |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_G |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_H |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_I |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_L |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_S |
|  |  |  |  |  |

Practices for Lesson 7: Creating a Logical Standby Database

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3 |  | IX |  | AQ$\_ORDERS\_QUEUETABLE\_T |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_C |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_G |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_H |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_I |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_L |
| CON\_ID |  | OWNER |  | TABLE\_NAME |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_S |
| 3 |  | IX |  | AQ$\_STREAMS\_QUEUE\_TABLE\_T |
| 3 |  | IX |  | ORDERS\_QUEUETABLE |
| 3 |  | IX |  | STREAMS\_QUEUE\_TABLE |
| 3 |  | OE |  | CATEGORIES\_TAB |
| 3 |  | OE |  | CUSTOMERS |
| 3 |  | OE |  | PURCHASEORDER |
| 3 |  | PM |  | PRINT\_MEDIA |
| 3 |  | SH |  | DIMENSION\_EXCEPTIONS |
| 20 rows selected. | | | | |

1. View the column names and data types that conflict with SQL Apply for only OE.CUSTOMERS table identified in the previous step. The command is this step could be repeated for each table if needed. Exit SQL\*Plus when done.

(host01) SQL> **SELECT CON\_ID, COLUMN\_NAME,DATA\_TYPE FROM CDB\_LOGSTDBY\_UNSUPPORTED WHERE OWNER='OE' AND TABLE\_NAME = 'CUSTOMERS';**

CON\_ID COLUMN\_NAME DATA\_TYPE

3 PHONE\_NUMBERS

VARRAY

(host01) SQL> **exit;**

Practices for Lesson 7: Creating a Logical Standby Database

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# Practice 7-2: Create a Logical Standby (Temporarily a Physical)

### Overview

In this practice, you will prepare host03 to receive the logical standby database and create the logical standby database using RMAN and SQL.

### Tasks

1. Use a terminal window logged in as oracle to host03 to create the initial directories needed for a logical standby database. You may want to consider having a separate terminal windows open for the host03/london and host03/london2 combinations. For this lab section you will be working with the host03/london2 combination. Since the primary database is using multi-tenant architecture, additional directories are needed.

[oracle@host03]$ **mkdir -p /u01/app/oracle/admin/london2/adump**

[oracle@host03]$ **mkdir -p /u01/app/oracle/oradata/london2**

[oracle@host03]$ **mkdir -p**

**/u01/app/oracle/oradata/london2/pdbseed**

[oracle@host03]$ **mkdir -p /u01/app/oracle/oradata/london2/dev1**

[oracle@host03]$ **mkdir -p**

**/u01/app/oracle/fast\_recovery\_area/london2**

1. Create a starter initialization file on host03 for the london2 logical standby instance. The only two parameters required are DB\_NAME and DB\_DOMAIN.

[oracle@host03]$ **echo 'DB\_NAME=london2' >**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/initlondon2.ora**

[oracle@host03]$ **echo 'DB\_DOMAIN=example.com' >>**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/initlondon2.ora**

1. Copy the password file from the primary database to the new logical standby database. Since a copy already exists on host03, we use the same file renaming it accordingly.

[oracle@host03]$ **cp**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon**

**/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon2**

1. Startup nomount the london2 standby instance on host03. You will need to set or change the environment variables to the london2 standby instance. Up to this point in labs, we have been using london when on host03.

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

ORACLE\_SID = [oracle] ? **london2**

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

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 03:51:01

2013

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Practices for Lesson 7: Creating a Logical Standby Database

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(host03) SQL> **startup nomount**

ORACLE instance started.

Total System Global Area 217157632 bytes Fixed Size 2286656 bytes Variable Size 159386560 bytes

Database Buffers 50331648 bytes

Redo Buffers 5152768 bytes

(host03) SQL> **exit**

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

1. Create a physical standby on host03 using the RMAN utility. The physical standby will be converted to a logical standby later in the practice. Exit RMAN when done.

[oracle@host03]$ **rman target sys/oracle\_4U@boston auxiliary sys/oracle\_4U@london2**

Recovery Manager: Release 12.1.0.1.0 - Production on Fri Aug 23 02:39:07 2013

Copyright (c) 1982, 2013, Oracle and/or its affiliates. All rights reserved.

connected to target database: BOSTON (DBID=2511874565) connected to auxiliary database: LONDON2 (not mounted)

RMAN> **run {**

#### allocate channel prmy1 type disk;

**allocate auxiliary channel stby1 type disk;**

#### duplicate target database for standby from active database spfile

**parameter\_value\_convert 'boston','london2' set db\_unique\_name='london2'**

#### set db\_file\_name\_convert='boston','london2' set log\_file\_name\_convert='boston','london2' set fal\_server='boston'

**nofilenamecheck;**

#### allocate auxiliary channel stby type disk;

**sql channel stby "alter database recover managed standby database disconnect"; }**

…

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<<<<<Output truncated. Output is almost identical to the complete output shown in Practice 4, except that the destination name is 'london2' instead of 'london'>>>>>

…

RMAN> **exit;**

Recovery Manager complete.

# Practice 7-3: Start Redo Transport and Verify Operation

### Overview

In this practice, you will start the redo transport from host01 to host03 for the new physical standby and verify operation.

### Tasks

1. Use a terminal window for host01 logged in as oracle with the environment variables set to boston and start redo transport by defining log\_archive\_dest\_3 pointing to the logical standby database.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 06:28:00

2013

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Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter system set log\_archive\_dest\_3='SERVICE=london2 SYNC REOPEN=15 valid\_for=(ONLINE\_LOGFILES,PRIMARY\_ROLE) db\_unique\_name=london2' scope=both;**

System altered.

**Note:** For this step, we are configuring redo transportation from the primary database to the logical standby database. Even though there is a far sync configured, we are not using the far sync at this moment. This is designed to illustrate a typical configuration where the primary database transports redo directly to the standby site, and provide a little variation in the architecture. Again, this is for illustration only. At a later time, we will change this to use the far sync instance.

1. Determine the last sequence number archived on the primary database.

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

182

1

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1. Use a terminal window on host03 connected as oracle with the environment variables set to london2. Start SQL\*Plus and determine the last sequence number of the physical standby instance.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 06:58:53

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

182

1

1. Return to the terminal window of host01, and force a log switch to advance the online redo log sequence number. Verify the sequence number has increased.
2. Return to the terminal window of host03, and verify that the physical standby instance is receiving redo from the primary database instance

(host01) SQL> **alter system switch logfile;**

System altered.

(host01) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

183

1

(host03) SQL> **SELECT MAX(SEQUENCE#), THREAD# FROM V$ARCHIVED\_LOG GROUP BY THREAD#;**

MAX(SEQUENCE#) THREAD#

183

1

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# Practice 7-4: Convert Physical Standby to Logical Standby

### Overview

In this practice, you will convert the newly created physical standby 'london2' to a logical standby database.

### Tasks

1. Use a terminal window on host03 connected as oracle with the environment variables set to london2. Stop redo apply on the 'london2' physical standby.

(**host03**) SQL> **alter database recover managed standby database cancel;**

Database altered.

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Build the LogMiner dictionary into the redo. Wait for this procedure to finish before continuing with labs.

(**host01**) SQL> **execute dbms\_logstdby.build;**

PL/SQL procedure successfully completed.

1. Use a terminal window on host03 connected as oracle with the environment variables set to london2. Continue applying redo data to the physical standby until it is ready to convert to a logical standby database.

(**host03**) SQL> **alter database recover to logical standby london2;**

Database altered.

1. Increase the SGA size allocated to the logical standby database.

(**host03**) SQL> **alter system set memory\_max\_target=640M scope=spfile;**

System altered.

(**host03**) SQL> **alter system set memory\_target=640M scope=spfile;**

System altered.

1. Shutdown the logical standby database on host03, and restart it in the MOUNT mode.

(host03) SQL> **shutdown;**

ORA-01507: database not mounted ORACLE instance shut down.

(host03) SQL> **startup mount;**

ORACLE instance started.

Total System Global Area 668082176 bytes Fixed Size 2291952 bytes Variable Size 591398672 bytes

Database Buffers 71303168 bytes

Redo Buffers 3088384 bytes

Database mounted.

Practices for Lesson 7: Creating a Logical Standby Database

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1. Display the LOG\_ARCHIVE\_DEST parameters on host03 that were copied from the primary database. Only entries that have values are displayed below.

(host03) SQL> **show parameter log\_archive\_dest**

NAME TYPE VALUE

log\_archive\_dest\_1 string

log\_archive\_dest\_2 string

location=USE\_DB\_RECOVERY\_FILE\_ DEST valid\_for = (ALL\_LOGFILES, ALL\_ROLES) db\_unique\_name = london2

SERVICE=london2FS SYNC REOPEN=

15 valid\_for=(ONLINE\_LOGFILES, PRIMARY\_ROLE) db\_unique\_name=

bostonFS

1. Remove the LOG\_ARCHIVE\_DEST\_2 entry on host03 since this logical database will not be a target for role reversal in this course.

(host03) SQL> **alter system set log\_archive\_dest\_2='' scope=both;**

System altered.

1. Open the logical standby database.

(host03) SQL> **alter database open resetlogs;**

Database altered.

1. Start SQL Apply to begin applying redo data that is received from the primary database.

(host03) SQL> **alter database start logical standby apply immediate;**

Database altered.

1. Open the DEV1 PDB and verify the mode that is was opened with.

(host03) SQL> **alter pluggable database dev1 open;**

Pluggable database altered.

(host03) SQL> **select con\_id, name, open\_mode from v$containers;**

CON\_ID NAME

OPEN\_MODE

1. CDB$ROOT
2. PDB$SEED
3. *DEV1*

READ WRITE READ ONLY

*READ WRITE*

1. Exit SQL\*Plus sessions on all host mahines. Leave the terminal session windows open with the environment variables set.

(host01) SQL> **exit;**

(host03) SQL> **exit;**

Practices for Lesson 7: Creating a Logical Standby Database

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**Practices for Lesson 8: Oracle Data Guard Broker: Overview**

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**Practices for Lesson 8: Overview**

**Practices Overview**

There are no practices for lesson 8.

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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**Practices for Lesson 9: Creating a Data Guard Broker Configuration**

**Chapter 9**

# Practices for Lesson 9: Overview

### Practices Overview

In these practices, you will examine the differences between local and remote connections to the Oracle Database instance using the DGMRL utility. You will also create and enable a Data Guard broker configuration.

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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# Practice 9-1: Establishing Local and Remote Connections with DGMGRL

### Overview

In this practice, you will use DGMGRL and connect with both local and remote connections. The password file will be updated on the primary database and copied to every other destination in the Data Guard configuration.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Issue the "ID" command and verify that the dgdba operating system group is assigned to the oracle account.

[oracle@host01]$ **id**

uid=54321(oracle) gid=54321(oinstall) groups=54321(oinstall),54322(dba),54323(oper),54324(backupdba),5 4325(dgdba),54326(kmdba)

**Note:** The oracle user is a member of the dgdba group. This group was specified during the database software installation to be associated with the SYSDG privilege for Data Guard.

1. Launch the DGMGRL utility and verify that you are able to connect as the sysdg user with operating system authentication (The oracle OS user is in the dgdba group).

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

DGMGRL> **connect sysdg**

Password: <<Any password will work>> Connected as SYSDG.

**Note:** With Operating System authentication, any password will work for local connections. However, during switchover and failover operation to the remote site, you must use the correct password.

1. Attempt to make a remote connection to the physical standby database 'london' as the

sysdg user. You must use the password that is in the password file. Exit DGMGRL.

(host01) DGMGRL> **connect sysdg@london**

Password: **oracle\_4U**

ORA-01017: invalid username/password; logon denied

(host01) DGMGRL> **exit**

**Note:** During the creation of the database, the option to use the same password for all administrative accounts was chosen. However, this only applied to the SYS and SYSTEM database accounts.

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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1. Use SQL\*Plus on host01 connected as SYSDBA to reset the SYSDG password and unlock the account. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Sep 11 06:17:09

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter user sysdg identified by oracle\_4U;**

User altered.

(host01) SQL> **alter user sysdg account unlock;**

User altered.

(host01) SQL> **exit;**

1. Copy the modified password file to all other machines overwriting the password files that are already there. On host03, a password file is needed for both the physical standby database and the logical standby database. The password files should be renamed during the copy to the appropriate names for each destination.

[oracle@host01]$ **scp $ORACLE\_HOME/dbs/orapwboston host02:/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwbostonFS**

orapwboston 100% 7680 7.5KB/s 00:00

[oracle@host01]$ **scp $ORACLE\_HOME/dbs/orapwboston host03:/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon**

orapwboston 100% 7680 7.5KB/s 00:00

[oracle@host01]$ **scp $ORACLE\_HOME/dbs/orapwboston host03:/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondon2**

orapwboston 100% 7680 7.5KB/s 00:00

[oracle@host01]$ **scp $ORACLE\_HOME/dbs/orapwboston host04:/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/orapwlondonFS**

orapwboston 100% 7680 7.5KB/s 00:00

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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1. Launch the DGMGRL utility on host01 and verify that you are now able to establish a remote connection as sysdg to the physical standby database. Exit DGMGRL when done.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@london**

Connected as SYSDG.

(host01) DGMGRL> **exit**

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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# Practice 9-2: Create and Enable a Data Guard Broker Configuration

### Overview

In this practice, you will create and name the Data Guard configuration. The physical standby database, far sync instances, and logical standby database will be added to the configuration. You will enable the configuration and define redo routing rules.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and reset the LOG\_ARCHIVE\_DEST\_2 and LOG\_ARCHIVE\_DEST\_3 parameters since they are defined as network locations. Start the Data Guard Broker process. Make sure the changes are persistent. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Sep 11 06:17:09

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter system set log\_archive\_dest\_2='' scope=both;**

System altered.

(host01) SQL> **alter system set log\_archive\_dest\_3='' scope=both;**

System altered.

(host01) SQL> **alter system set dg\_broker\_start=true scope=both;**

System altered.

(host01) SQL> **exit**

1. Use a terminal window on host02 connected as oracle with the environment variables set to 'bostonFS'. Connect to the Far Sync using SQL\*Plus and reset the LOG\_ARCHIVE\_DEST\_2 parameter since it is defined as network location. Start the Data Guard broker process for the Far Sync. Exit SQL\*Plus.

[oracle@host02]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Sep 11 06:17:09

2013

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With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host02) SQL> **alter system set log\_archive\_dest\_2='' scope=both;**

System altered.

(host02) SQL> **alter system set dg\_broker\_start=true scope=both;**

System altered

(host02) SQL> **exit**

1. Use a terminal window on host03 connected as oracle with the environment variables set to 'london'. Connect to the physical standby using SQL\*Plus and stop managed recovery. Reset the LOG\_ARCHIVE\_DEST\_2 parameter since it is defined as network location. Start the Data Guard broker process for the physical standby database.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Sep 11 06:17:09

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **alter database recover managed standby database cancel;**

Database altered.

(host03) SQL> **alter system set log\_archive\_dest\_2='' scope=both;**

System altered

(host03) SQL> **alter system set dg\_broker\_start=true scope=both;**

System altered

1. If you are using a separate window for the host03/london2 combination, then you can skip the part about resetting the environment variables. Otherwise, while still using the terminal window for host03, exit SQL\*Plus. Change the environment variables to the 'london2' logical standby database. The logical standby does not have any network locations defined for redo transportation. Start the Data Guard broker process. Exit SQL\*Plus.

(host03) SQL> **exit**

Disconnected from Oracle Database 12c Enterprise Edition Release

12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

[oracle@host03]$ **. oranev**

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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ORACLE\_SID = [oracle] ? **london2**

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

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Jun 11 03:51:01

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **alter database stop logical standby apply;**

Database altered.

(host03) (london2) SQL> **alter system set dg\_broker\_start=true scope=both;**

System altered.

(host03) SQL> **exit**

1. Use a terminal window on host04 connected as oracle with the environment variables set to 'londonFS'. Connect to the Far Sync using SQL\*Plus and reset the LOG\_ARCHIVE\_DEST\_2 parameter since it is defined as network location. Start the Data Guard broker process for the Far Sync. Exit SQL\*Plus.

[oracle@host04]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Sep 11 06:17:09

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host04) SQL> **alter system set log\_archive\_dest\_2='' scope=both;**

System altered

(host04) SQL> **alter system set dg\_broker\_start=true scope=both;**

System altered

(host04) SQL> **exit**

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Launch DGMGRL and attempt to show the configuration.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

(host01) DGMGRL> **show configuration**

ORA-16532: Data Guard broker configuration does not exist Configuration details cannot be determined by DGMGRL

1. Create the Data Guard broker configuration and then show the configuration.

(host01) DGMGRL> **create configuration 'DRSolution' as primary database is 'boston' connect identifier is boston;**

Configuration "DRSolution" created with primary database "boston"

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database

Fast-Start Failover: DISABLED

Configuration Status: DISABLED

**Note:** Since the Data Guard broker is a distributed framework, the DGMGRL utility can be launched from any host machine that participates in the Data Guard configuration. The labs will continue to display the machine name (host01), and therefore the terminal session window being used, for which the DGMGRL utility was launched. It would be acceptable though to launch it from another terminal session connected to another virtual host machine.

1. Add the Far Sync 'bostonFS' to the configuration and show the results.

(host01) DGMGRL> **add far\_sync 'bostonFS' as connect identifier is bostonFS;**

far sync instance "bostonFS" added

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Configuration Status: DISABLED

1. Add the physical standby database 'london' to the configuration and show the results.

(host01) DGMGRL> **add database 'london' as connect identifier is london;**

Database "london" added

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync (inactive)

london - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status: DISABLED

1. Add the logical standby database 'london2' to the configuration and show the results.

(host01) DGMGRL> **add database 'london2' as connect identifier is london2;**

Database "london2" added

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync (inactive)

london - Physical standby database

london2 - Logical standby database

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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Fast-Start Failover: DISABLED

Configuration Status: DISABLED

1. Add the Far Sync 'londonFS' to the configuration and show the results.

(host01) DGMGRL> **add far\_sync 'londonFS' as connect identifier is londonFS;**

far sync instance "londonFS" added

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync (inactive)

london - Physical standby database london2 - Logical standby database londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Configuration Status: DISABLED

1. Enable the Data Guard broker configuration and show the results.

(host01) DGMGRL> **enable configuration**

Enabled.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync (inactive)

london - Physical standby database london2 - Logical standby database londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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Configuration Status:

SUCCESS

1. Define redo routing rules for the configuration and show the results. The current primary database 'boston' should forward redo to the Far Sync 'bostonFS' synchronously. The Far Sync 'bostonFS' should forward redo to both the physical standby 'london' and to the logical standby 'london2' asynchronously. Additional redo routing rules should be created for role reversal. After role reversal, the primary database will be 'london' and should forward redo to the Far Sync 'londonFS' synchronously. The Far Sync 'londonFS' should then forward redo to the physical standby 'boston' and the logical standby 'london2'.

(host01) DGMGRL> **EDIT DATABASE 'boston' SET PROPERTY**

**'RedoRoutes' = '(boston:bostonFS SYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **EDIT FAR\_SYNC 'bostonFS' SET PROPERTY**

**'RedoRoutes' = '(boston:london,london2 ASYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **EDIT DATABASE 'london' SET PROPERTY**

**'RedoRoutes' = '(london:londonFS SYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **EDIT FAR\_SYNC 'londonFS' SET PROPERTY**

**'RedoRoutes' = '(london:boston,london2 ASYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **show configuration;**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

Practices for Lesson 9: Creating a Data Guard Broker Configuration

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**Note:** If you output does not match the above. Do not proceed with labs until all issues have been resolved. You may need to reissue the SHOW CONFIGURATION command several times to give the Virtual Machines time to catch up with all the background operations that need to be performed. For example in one test case, it was noted that the london2 logical standby database was receiving "ORA-16810: multiple errors or warnings detected for this database." To further diagnose the problem issue the command "show database london2". SQL Apply had stopped with an "ORA-16768: SQL Apply is stopped" message, followed by "ORA-01304: subordinate process error. Check alert and trace logs." An examination of the alert log indicated that SQL Apply had stopped due to an "ORA-4031: unable to allocate XXX bytes of shared memory." SQL Apply was restarted with the command "edit database london set state='APPLY-ON'", at which time the configuration reported everything acceptable. Please consult with your instructor if you need to troubleshoot any issues.

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Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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**Practices for Lesson 10: Monitoring a Data Guard Broker Configuration**

**Chapter 10**

# Practices for Lesson 10: Overview

### Practices Overview

In these practices, you will use the DGMGRL utility to monitor your physical standby database. You will also examine the use of trace files to monitor the Data Guard environment.

Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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# Practice 10-1: Monitoring the Physical Standby Database

### Overview

In this practice, you will use DGMGRL and connect with both local and remote connections. The password file will be updated on the primary database and copied to every other destination in the Data Guard configuration.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Launch DGMGRL connecting as the sysdg user with operating system authentication.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Use the SHOW CONFIGURATION VERBOSE command to display the current values for the

CommunicationTimeout property and the OperationTimeout property.

(host01) DGMGRL> **show configuration verbose**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive)

Properties:

FastStartFailoverThreshold = '30'

**OperationTimeout = '30'**

TraceLevel = 'USER'

FastStartFailoverLagLimit = '30'

**CommunicationTimeout = '180'**

ObserverReconnect = '0' FastStartFailoverAutoReinstate = 'TRUE' FastStartFailoverPmyShutdown = 'TRUE' BystandersFollowRoleChange = 'ALL' ObserverOverride = 'FALSE'

Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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Fast-Start Failover: DISABLED

Configuration Status: SUCCESS

1. Modify the CommunicationTimeout property and set it to a value of 300. Verify the result.

(host01) DGMGRL> **edit configuration set property 'CommunicationTimeout' = 300;**

Property "CommunicationTimeout" updated

(host01) DGMGRL> **show configuration verbose**

…

Properties:

FastStartFailoverThreshold = '30'

OperationTimeout = '30'

TraceLevel = 'USER'

FastStartFailoverLagLimit = '30'

CommunicationTimeout = '300'

ObserverReconnect = '0' FastStartFailoverAutoReinstate = 'TRUE'

…

**Note:** This is not normally needed but it helps with labs running in the Virtual Machine architecture.

1. Modify the OperationTimeout property and set it to the maximum value of 300. Verify the result.

(host01) DGMGRL> **edit configuration set property 'OperationTimeout' = 300;**

Property "CommunicationTimeout" updated

(host01) DGMGRL> **show configuration verbose**

…

Properties:

FastStartFailoverThreshold = '30'

OperationTimeout = '300'

TraceLevel = 'USER'

FastStartFailoverLagLimit = '30'

CommunicationTimeout = '300'

ObserverReconnect = '0' FastStartFailoverAutoReinstate = 'TRUE'

…

Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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1. Use the SHOW DATABASE command for the physical standby database and determine the current transport lag, apply lag, and apply rate.

(host01) DGMGRL> **show database london**

Database - london

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: 0 seconds (computed 0 seconds ago) Apply Lag: 0 seconds (computed 0 seconds ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

london

Database Status:

SUCCESS

1. Stop redo apply on the physical standby database to force an apply rate lag to occur.

(host01) DGMGRL> **edit database london set state = 'APPLY-OFF';**

Succeeded.

1. Without exiting DGMGRL, force a log switch on the primary database.

**Note:** You are currently connected to the primary database.

(host01) DGMGRL> **SQL "alter system switch logfile";**

Succeeded.

1. Use the SHOW DATABASE command for the physical standby database and display the current apply lag rate.

(host01) DGMGRL> **show database london**

Database - london

Role: PHYSICAL STANDBY

Intended State: APPLY-OFF

Transport Lag: 0 seconds (computed 0 seconds ago) Apply Lag: 33 seconds (computed 0 seconds ago) Apply Rate: (unknown)

Real Time Query: OFF Instance(s):

london

Database Status:

SUCCESS

Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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1. Display the standby receive queue for the physical standby database.

(host01) DGMGRL> **show database london 'RecvQEntries';**

STANDBY\_RECEIVE\_QUEUE

STATUS RESETLOGS\_ID THREAD LOG\_SEQ TIME\_GENERATED TIME\_COMPLETED FIRST\_CHANGE# NEXT\_CHANGE# SIZE (KBs)

PARTIALLY\_APPLIED 837070180 1

41 01/17/2014 13:26:46 01/17/2014 14:22:47 2084714

2096633 8084

1. Restart redo apply on the physical standby database. Verify that the apply lag has been cleared. Exit DGMGRL when done.

**Note:** You may have to wait a minute after restarting redo apply to verify the results.

(host01) DGMGRL> **edit database london set state = 'APPLY-ON';**

Succeeded.

(host01) DGMGRL> **show database london**

Database - london

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: 0 seconds (computed 0 seconds ago) Apply Lag: 0 seconds (computed 0 seconds ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

london

Database Status:

SUCCESS

(host01) DGMGRL> **exit;**

Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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# Practice 10-2: Examining Data Guard Log and Trace Files

### Overview

In this practice, you will locate and examine the Data Guard log and trace files.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and determine the root directory for the Automatic Diagnostic Repository (ADR). Exit SQL\*Plus when done.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Oct 15 21:07:58

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **show parameter diag**

NAME

TYPE

VALUE

diagnostic\_dest

string

/u01/app/oracle

(host01) SQL> **exit;**

1. Change directory to the "trace" subdirectory located underneath the Automatic Diagnostic Repository home location. The ADR home is located at

<diagnostic\_dest>/diag/rdbms/<dbname>/<instance\_name>.

[oracle@host01]$ **cd**

**/u01/app/oracle/diag/rdbms/boston/boston/trace**

1. Verify that the previous commands that changed the state of redo apply and connection timeout where recorded in the Data Guard broker log file. The broker log file is named drc<db\_unique\_name>.log.

[oracle@host01]$ **grep CommunicationTimeout drcboston.log**

EDIT CONFIGURATION SET PROPERTY CommunicationTimeout = 300

[oracle@host01]$ **grep APPLY drcboston.log**

EDIT DATABASE london SET STATE = APPLY-OFF EDIT DATABASE london SET STATE = APPLY-ON

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1. Use the "ls -alt | more" command to list the directory contents of the trace directory sorted by modification time descending. The most recent modified file will be displayed first.

[oracle@host01]$ **ls -alt | more**

total 12084

-rw-r-----

-rw-r-----

1 oracle oinstall 4266449 Oct 15 21:20 drcboston.log

1 oracle oinstall

8602 Oct 15 21:18

boston\_mmon\_10187.trc

-rw-r----- 1 oracle oinstall 868 Oct 15 21:18 boston\_mmon\_10187.trm

drwxr-x--- 2 oracle oinstall 36864 Oct 15 20:58 .

-rw-r----- 1 oracle oinstall 2256 Oct 15 20:51 boston\_nsv1\_7354.trc

-rw-r----- 1 oracle oinstall 217 Oct 15 20:51 boston\_nsv1\_7354.trm

…

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and set the level to 16 to track detailed archived redo log destination activity. Force a log switch and exit SQL\*Plus when done.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Oct 15 21:21:32

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> **alter system set log\_archive\_trace=16;**

System altered.

SQL> **alter system switch logfile;**

System altered.

(host01) SQL> **exit;**

1. Use the "ls -alt | more" command to list the directory contents of the trace directory sorted by modification time descending. Identify the newly created files in the directory that were not present for the previous step 4.

[oracle@host01]$ **ls -alt | more**

total 12104

-rw-r----- 1 oracle oinstall 16177 Oct 15 21:22

***boston\_lgwr\_10177.trc***

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-rw-r----- 1 oracle oinstall

1202 Oct 15 21:22

***boston\_lgwr\_10177.trm***

-rw-r----- 1 oracle oinstall 8490 Oct 15 21:22

***boston\_nss2\_10213.trc***

-rw-r----- 1 oracle oinstall 540 Oct 15 21:22

***boston\_nss2\_10213.trm***

-rw-r----- 1 oracle oinstall 274595 Oct 15 21:22 alert\_boston.log

-rw-r----- 1 oracle oinstall 2179 Oct 15 21:22 boston\_arc0\_10217.trc

-rw-r----- 1 oracle oinstall 181 Oct 15 21:22 boston\_arc0\_10217.trm

…

1. The resulting log writer process (LGWR) and network server sync process (NSS) trace files can be very large in size. Since the primary database is configured for SYNC redo transport to the 'bostonFS' far sync destination, verify that communication occurred to this destination in the trace file using the "grep destination <NSS2 trace file name>" command. The trace file name must be determined from the previous step. You may explore the contents of the trace files if desired.

[oracle@host01]$ **grep destination boston\_nss2\_10213.trc**

NSS2: connecting to remote destination bostonfs NSS2: connecting to remote destination bostonfs

NSS2: connecting to remote destination bostonfs

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and set the log\_archive\_trace level to 0 to disable tracing. Exit SQL\*Plus when done.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Oct 15 21:21:32

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter system set log\_archive\_trace=0;**

System altered.

(host01) SQL> **exit;**

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Practices for Lesson 10: Monitoring a Data Guard Broker Configuration

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Practices for Lesson 11: Configuring Data Protection Modes

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**Practices for Lesson 11: Configuring Data Protection Modes**

**Chapter 11**

Practices for Lesson 11: Configuring Data Protection Modes

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**Practices for Lesson 11: Overview**

**Practices Overview**

In these practices, you will examine the various protection modes and the impact that they may have on the primary database.

# Practice 11-1: Examining the Maximum Availability Protection Mode

### Overview

In this practice, you will use DGMGRL to view the current protection mode and modify it to maximum availability. You will simulate a problem on the standby database and observe the impact if any to the primary database.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Use the SHOW CONFIGURATION command to display the current protection mode for the Data Guard configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: ***MaxPerformance***

Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

1. Using DGMGRL, determine the current LogXptMode for the far sync instance and the physical standby database.

(host01) DGMGRL> **show far\_sync 'bostonFS' 'LogXptMode';**

LogXptMode = 'ASYNC';

(host01) DGMGRL> **show database london 'LogXptMode';**

LogXptMode = 'ASYNC';

Practices for Lesson 11: Configuring Data Protection Modes

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1. ***Optional:*** If the current LogXptMode is not reported as 'ASYNC' for both the far sync instance and the physical standby database, then explicitly set it to 'ASYNC'. Exit DGMGRL when done.

(host01) DGMGRL> **edit far\_sync 'bostonFS' set property 'LogXptMode' = 'ASYNC';**

Property "LogXptMode" updated

(host01) DGMGRL> **edit database london set property LogXptMode = ASYNC;**

Property "logxptmode" updated

(host01) DGMGRL> **exit;**

**Note:** Database names, far sync instance names, property names and property values do not need to be enclosed with single quote marks unless they are case sensitive. The documentation examples generally use a single quote for both property names and property values and that convention has been followed in these labs. For the above example, only the far sync name 'bostonFS' would require it to be enclosed by single quotes. The second edit command does not use any single quotes for illustration.

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and determine the current value for the LOG\_ARCHIVE\_DEST\_2 parameter. What is the current LogXptMode? Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Oct 16 19:22:29

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **show parameter LOG\_ARCHIVE\_DEST\_2**

NAME

TYPE

VALUE

log\_archive\_dest\_2 string

service="bostonfs", ***SYNC AFFIRM*** delay=0 optional compression=disable max\_failure=0 max\_connections=1 reopen=300 db\_unique\_name="bostonFS" net\_timeout=30, valid\_for=

(online\_logfile, all\_roles)

(host01) SQL> **exit;**

Practices for Lesson 11: Configuring Data Protection Modes

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1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Display the value for the 'RedoRoutes' property of the primary database.

(host01) DGMGRL> **show database 'boston' 'RedoRoutes';**

RedoRoutes = '(boston:bostonFS SYNC)'

**Note:** When the property 'RedoRoutes' has been defined, it takes precedence over the value of the property 'LogXptMode'. The property 'LogXptMode' will continue to report 'ASYNC' even though the actual transport mode is currently 'SYNC'.

1. Modify the 'RedoRoutes' property for the 'boston' primary database and set it to the 'ASYNC' redo transport mode.

(host01) DGMGRL> **edit database boston set property 'RedoRoutes'**

**= '(boston:bostonFS ASYNC)';**

Property "RedoRoutes" updated

1. Attempt to change the configuration mode to maximum availability and notice the results.

(host01) DGMGRL> **edit configuration set protection mode as maxavailability;**

Error: ORA-16627: operation disallowed since no standby databases would remain to support protection mode

Failed.

1. Modify the 'RedoRoutes' property for the 'boston' primary database and set it to the new 'FASTSYNC' redo transport mode.

(host01) DGMGRL> **edit database boston set property 'RedoRoutes'**

**= '(boston:bostonFS FASTSYNC)';**

Property "RedoRoutes" updated

1. Change the configuration mode to maximum availability and verify the results.

(host01) DGMGRL> **edit configuration set protection mode as maxavailability;**

Succeeded.

(host01) DGMGRL> **show configuration;**

Configuration - DRSolution

Practices for Lesson 11: Configuring Data Protection Modes

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Protection Mode: ***MaxAvailability***

Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

1. Use a terminal window on host03 connected as oracle with the environment variables set to 'london'. Connect to the physical standby database using SQL\*Plus and perform a shutdown abort.

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

ORACLE\_SID = [london2] ? **london**

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Thu Dec 12 17:16:46

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> s**hutdown abort;**

ORACLE instance shut down.

1. Return to the DGMGRL session running on host01 and display the configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

boston - Primary database bostonFS - Far Sync

Error: ORA-16778: redo transport error for one or more databases

Practices for Lesson 11: Configuring Data Protection Modes

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london - Physical standby database Error: ORA-01034: ORACLE not available

london2 - Logical standby database londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Configuration Status: ERROR

1. Use a terminal window on host03 connected as oracle with the environment variables set to 'london'. Use SQL\*Plus to restart and mount the physical standby database. Verify that the 'DEV1' pluggable database is also mounted.

(host03) SQL> **startup mount**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

(host3) SQL> **show pdbs**

CON\_ID CON\_NAME

OPEN MODE RESTRICTED

1. PDB$SEED
2. DEV1

MOUNTED

MOUNTED

1. Return to the DGMGRL session running on host01 and display the configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database Error: ORA-16766: Redo Apply is stopped

london2 - Logical standby database

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londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

ERROR

**Note:** the broker may have restarted redo apply before you are able to see the above error. In addition, you may also receive a warning ORA-16857 standby disconnected from redo source for longer than specified threshold. This is acceptable.

1. Restart redo apply for the physical standby database. Perform a log switch on the primary database and verify the configuration.

(host01) DGMGRL> **edit database london set state = 'APPLY-ON';**

Succeeded.

(host01) DGMGRL> **SQL "alter system switch logfile";**

Succeeded.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: DISABLED

Configuration Status:

SUCCESS

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1. Before proceeding with additional lab steps, give the transport lag and apply lag an opportunity to catch up. In this training environment, all five VMs and domain 0 typically share a single physical desktop class disk drive. Use the 'show configuration' and 'show database verbose london' commands until the lag clears. Repeat these commands as needed.

DGMGRL> **show database verbose london**

Database - london

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: **0 seconds** (computed 1 second ago) Apply Lag: **0 seconds** (computed 1 second ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

london

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# Practice 11-2: Examining the Maximum Protection Mode

### Overview

In this practice, you will use DGMGRL to modify the current protection mode to maximum protection. You will simulate a problem on the standby database and observe the impact to the primary database.

### Tasks

1. Modify the 'RedoRoutes' property for the 'boston' primary database and set it to the 'SYNC' redo transport mode. Enable the maximum protection mode for the Data Guard configuration.

(host01) DGMGRL> **edit database boston set property 'RedoRoutes'**

**= '(boston:bostonFS SYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **edit configuration set protection mode as maxprotection;**

Error: ORA-16627: operation disallowed since no standby databases would remain to support protection mode

Failed.

**Note:** The maximum protection mode is not supported by far sync.

1. Modify the redo transport routes so that the primary database ships redo to both the 'bostonFS' far sync and the 'london' physical standby database directly using the SYNC property. Modify the 'bostonFS' far sync so that it only ships redo to the 'london2' logical standby database using the ASYNC property. We are temporarily bypassing the far sync between the primary database and the physical standby database, but leaving the far sync in place for the logical standby database. This is for lab illustration only and would not be practical otherwise.

(host01) DGMGRL> **edit database boston set property 'RedoRoutes'**

**= '(boston:bostonFS,london SYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **edit far\_sync 'bostonFS' set property 'RedoRoutes' = '(boston:london2 ASYNC)';**

Property "RedoRoutes" updated

1. Enable the maximum protection mode for the Data Guard configuration and display the resulting configuration. Exit DGMGRL.

(host01) DGMGRL> **edit configuration set protection mode as maxprotection;**

Succeeded.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Practices for Lesson 11: Configuring Data Protection Modes

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Protection Mode: MaxProtection Databases:

boston - Primary database bostonFS - Far Sync

london2 - Logical standby database london - Physical standby database londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Configuration Status: SUCCESS

(host01) DGMGRL> **exit**

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and switch the session to the DEV1 pluggable database. Leave this window open.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Oct 16 23:19:29

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter session set container=DEV1;**

Session altered.

1. Use a terminal window on host03 connected as oracle with the environment variables set to 'london'. Connect to the physical standby database using SQL\*Plus and perform a shutdown abort.

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

ORACLE\_SID = [london2] ? **london**

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Thu Dec 12 17:16:46

2013

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Connected to:

Practices for Lesson 11: Configuring Data Protection Modes

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> s**hutdown abort;**

ORACLE instance shut down.

1. Return to the SQL\*Plus session on host01 with the session set to the DEV1 pluggable database. Display the current data for the HR.REGIONS table and then insert a new row into the table. Exit the terminated session.

(host01) SQL> **select \* from hr.regions order by region\_id;**

REGION\_ID REGION\_NAME

1. Europe
2. Americas
3. Asia
4. Middle East and Africa
5. Australia

(host01) SQL> **insert into hr.regions values (6,'MyRegion');**

insert into hr.regions values (6,'MyRegion')

\*

ERROR at line 1:

ORA-03135: connection lost contact Process ID: 19624

Session ID: 20 Serial number: 3265

**Note:** If the row inserts successfully, then attempt to commit the change.

1 row created. (host01) SQL> **commit;** ERROR at line 1:

ORA-03113: end-of-file on communication channel Process ID: 15203

Session ID: 65 Serial number: 2297

(host01) SQL> **exit**

**Note:** The primary database has been brought down due to the maximum protection mode and not having the standby database available to accept redo. Depending on timings and blocks cached in memory, the insert may be successful, but the commit will always fail. You may have to wait for the timeout period to elapse before seeing the error message.

Practices for Lesson 11: Configuring Data Protection Modes

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1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and restart the instance. If the instance is already running then open the database. Exit the terminated session.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Oct 16 23:34:43

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host01) SQL> **startup**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

ORA-03113: end-of-file on communication channel Process ID: 19973

Session ID: 1 Serial number: 5

(host01) SQL> **exit**

**Note:** The primary cannot be started with the physical standby down with the maximum protection mode and no other standby databases available that support this mode.

1. Use a terminal window on host03 connected as oracle with the environment variables set to 'london'. Use SQL\*Plus to startup and mount the physical standby database. Verify that the DEV1 pluggable database is mounted. Exit SQL\*Plus.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Oct 16 23:56:47

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host03) SQL> **startup mount**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

Practices for Lesson 11: Configuring Data Protection Modes

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CON\_ID |  | CON\_NAME |  | OPEN MODE |  | RESTRICTED |
| 2 |  | PDB$SEED |  | MOUNTED |  |  |
| 3 |  | DEV1 |  | MOUNTED |  |  |

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Use SQL\*Plus to open the primary database. Verify that the pluggable database is open. If not, then open it. Exit SQL\*Plus.

(host03) SQL> **show pdbs**

(host03) SQL> **exit**

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Oct 16 23:56:47

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host01) SQL> **startup**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

Database opened.

(host01) SQL> **alter pluggable database DEV1 open;**

Pluggable database altered.

(host01) SQL> **exit**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (host1) SQL> **show pdbs** |  | | | |
| CON\_ID CON\_NAME |  | OPEN MODE |  | RESTRICTED |
| 1. PDB$SEED 2. DEV1 |  | READ ONLY MOUNTED |  | NO |

Practices for Lesson 11: Configuring Data Protection Modes

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1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication. Display the Data Guard configuration.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxProtection Databases:

boston - Primary database bostonFS - Far Sync

london2 - Logical standby database london - Physical standby database londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED

Configuration Status: SUCCESS

1. Return the Data Guard protection mode to maximum performance.

(host01) DGMGRL> **edit configuration set protection mode as maxperformance;**

Succeeded.

1. Correct the redo routing rules such that the 'boston' primary database forwards redo to only the far sync using the FASTSYNC attribute. Adjust the far sync to forward redo to both the 'london' physical standby database and the 'london2' logical standby database using the ASYNC attribute.

(host01) DGMGRL> **edit database boston set property 'RedoRoutes'**

**= '(boston:bostonFS SYNC)';**

Property "RedoRoutes" updated

(host01) DGMGRL> **edit far\_sync 'bostonFS' set property 'RedoRoutes' = '(boston:london,london2 ASYNC)';**

Property "RedoRoutes" updated

Practices for Lesson 11: Configuring Data Protection Modes

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1. Restart Redo Apply on the physical standby database and perform a log switch on the primary database.

(host01) DGMGRL> **edit database london set state = 'APPLY-ON';**

Succeeded.

(host01) DGMGRL> **SQL "alter system switch logfile";**

Succeeded.

1. Display the resulting configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: DISABLED

Configuration Status:

SUCCESS

**Note:** It may take some time for Data Guard broker to resynchronize all the changes in this lab environment considering the hardware constraints. The following actions can be used if needed:

* + Stop and restart managed recovery on the physical standby database: **DGMGRL> edit database london set state = 'APPY-OFF'; DGMGRL> edit database london set state = 'APPY-ON';**
  + Stop and restart redo transport from the primary database: **DGMGRL> edit database boston set state = 'TRANSPORT-OFF'; DGMGRL> edit database boston set state = 'TRANSPORT-ON';**
  + Perform a log switch at the primary database:

#### DGMGRL> SQL "alter system switch logfile";

Practices for Lesson 11: Configuring Data Protection Modes

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1. Before proceeding with additional lab steps, give the transport lag and apply lag an opportunity to catch up. In this training environment, all five VMs and domain 0 typically share a single physical desktop class disk drive. Use the 'show configuration' and 'show database verbose london' commands until the lag clears. Repeat these commands as needed.

DGMGRL> **show database london**

Database - london

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: 0 seconds (computed 0 seconds ago) Apply Lag: 0 seconds (computed 0 seconds ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

london

Database Status:

SUCCESS

Practices for Lesson 11: Configuring Data Protection Modes

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Practices for Lesson 11: Configuring Data Protection Modes

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Practices for Lesson 12: Performing Role Transitions

Chapter 12 - Page 1

**Practices for Lesson 12: Performing Role Transitions**

**Chapter 12**

**Practices for Lesson 12: Overview**

**Practices Overview**

In these practices, you will perform a switchover, and then switch back to the original configuration.

Practices for Lesson 12: Performing Role Transitions

Chapter 12 - Page 2

# Practice 12-1: Performing Switchover

### Overview

In this practice, you will use DGMGRL view the configuration status, validate that the databases are ready for a role reversal, and then perform a switchover.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Use the SHOW CONFIGURATION command to display the configuration status for the Data Guard configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

1. Validate that the primary database is ready for role reversal using the VERBOSE option. The

VERBOSE option will show all checks being performed during validation.

(host01) DGMGRL> **validate database verbose boston**

Database Role:

Primary database

Ready for Switchover: ***Yes***

Capacity Information:

Practices for Lesson 12: Performing Role Transitions

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|  |  |  |
| --- | --- | --- |
| Database | Instances | Threads |
| boston | 1 | 1 |

1. Validate that the physical standby database is ready for role reversal using the VERBOSE

Temporary Tablespace File Information: boston TEMP Files: 1

Flashback Database Status: boston: Off

Data file Online Move in Progress: boston: No

Transport-Related Information: Transport On: Yes

Log Files Cleared:

boston Standby Redo Log Files: Cleared

Automatic Diagnostic Repository Errors: Error boston

No logging operation NO Control file corruptions NO System data file missing NO System data file corrupted NO System data file offline NO User data file missing NO User data file corrupted NO User data file offline NO Block Corruptions found NO

option.

(host01) DGMGRL> **validate database verbose london**

Database Role: Physical standby database Primary Database: boston

Ready for Switchover: ***Yes***

Ready for Failover: Yes (Primary Running)

Capacity Information:

Database Instances Threads

boston 1 1

london 1 1

Practices for Lesson 12: Performing Role Transitions

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Temporary Tablespace File Information: boston TEMP Files: 3

london TEMP Files: 3

Flashback Database Status: boston: Off

london: Off

Data file Online Move in Progress: boston: No

london: No

Standby Apply-Related Information: Apply State: Running

Apply Lag: 0 seconds

Apply Delay: 0 minutes

Transport-Related Information: Transport On: Yes

Gap Status: No Gap Transport Lag: 0 seconds Transport Status: Success

Log Files Cleared:

boston Standby Redo Log Files: Cleared london Online Redo Log Files: Cleared

Current Log File Groups Configuration:

Thread # Online Redo Log Groups Standby Redo Log Groups (boston) (london)

1 3 2

Future Log File Groups Configuration:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Thread # | Online Redo  (london) | Log | Groups | Standby Redo Log Groups  (boston) |
| 1 | 3 |  |  | 2 |

Current Configuration Log File Sizes:

Thread # Smallest Online Redo Smallest Standby Redo Log File Size Log File Size

(boston) (london)

1 50 MBytes 50 MBytes

Practices for Lesson 12: Performing Role Transitions

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Property | boston | | Value | london Value |
| DelayMins  ApplyParallel | 0  AUTO | |  | 0  AUTO |
| Transport-Related Property | Property | Settings: boston Value | | london Value |
| LogXptMode Dependency DelayMins Binding  MaxFailure |  | ASYNC  <empty> 0  optional  0 | | async  <empty> 0  optional  0 |
| MaxConnections |  | 1 | | 1 |
| ReopenSecs |  | 300 | | 300 |
| NetTimeout RedoCompression  LogShipping |  | 30  DISABLE ON | | 30  DISABLE ON |

**Note:** Your output will contain information regarding thread 3 of redo. There is no thread 3 on this database. This will be fixed with an upcoming patch for the existing issue in Oracle Database 12.1.0.1.0. It has been removed from the above output.

Future Configuration Log File Sizes:

Thread # Smallest Online Redo Smallest Standby Redo Log File Size Log File Size

(london) (boston)

1 50 MBytes 50 MBytes

Apply-Related Property Settings:

Automatic Diagnostic Repository Errors:

Error boston london

No logging operation NO NO Control file corruptions NO NO SRL Group Unavailable NO NO System data file missing NO NO System data file corrupted NO NO System data file offline NO NO User data file missing NO NO User data file corrupted NO NO User data file offline NO NO

Block Corruptions found NO NO

1. Switchover to the 'london' physical standby database.

(host01) DGMGRL> **switchover to london**

Performing switchover NOW, please wait...

Practices for Lesson 12: Performing Role Transitions

Chapter 12 - Page 6

Operation requires a connection to instance "london" on database "london"

Connecting to instance "london"... Connected as SYSDG.

New primary database "london" is opening...

Operation requires startup of instance "boston" on database "boston"

Starting instance "boston"... ORACLE instance started.

Database mounted.

Switchover succeeded, new primary is "london"

1. Display the new configuration.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

london - Primary database londonFS - Far Sync

boston - Physical standby database london2 - Logical standby database

bostonFS - Far Sync (inactive)

Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

(host01) DGMGRL> **exit;**

**Note:** Remember that the indentation used in the output of the SHOW CONFIGURATION

command indicates the hierarchy of how redo is being forwarded.

1. Use a terminal window on host03 connected as oracle with the environment variables set to london. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host03]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host03) DGMGRL> **connect sysdg/oracle\_4U@london**

Connected as SYSDG.

Practices for Lesson 12: Performing Role Transitions

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1. Perform a log switch on the new primary database 'london' from within DGMGRL.

(host03) DGMGRL> **SQL "alter system switch logfile";**

Succeeded.

1. Verify that the new standby database 'boston' has zero transport lag and zero apply lag. You may need to wait a minute for this to clear.

(host03) DGMGRL> **show database boston**

Database - boston

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: **0 seconds** (computed 0 seconds ago) Apply Lag: **0 seconds** (computed 0 seconds ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

Boston

Database Status:

SUCCESS

1. Validate that the new 'london' primary database is ready to switch back a second time. Do not use the VERBOSE option so you can compare the difference in output from the previous steps.

(host03) DGMGRL> **validate database london**

Database Role:

Primary database

Ready for Switchover: ***Yes***

Flashback Database Status: london: Off

1. Validate that the new 'boston' physical standby database is ready to switch back a second time. Do not use the VERBOSE option so you can compare the difference in output from the previous steps.

(host03) DGMGRL> **validate database boston**

Database Role: Physical standby database Primary Database: london

Ready for Switchover: ***Yes***

Ready for Failover: Yes (Primary Running)

Practices for Lesson 12: Performing Role Transitions

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Thread # | Online Redo  (boston) | Log | Groups | Standby Redo Log  (london) | Groups |
| 1 | 3 |  |  | 2 |  |

1. Switchover to the 'boston' physical standby database.

(host03) DGMGRL> **switchover to boston**

Performing switchover NOW, please wait...

Operation requires a connection to instance "boston" on database "boston"

Connecting to instance "boston"... Connected as SYSDG.

New primary database "boston" is opening...

Operation requires startup of instance "london" on database "london"

Starting instance "london"... ORACLE instance started.

Database mounted.

Switchover succeeded, new primary is "boston"

Flashback Database Status: london: Off

boston: Off

Current Log File Groups Configuration:

Thread # Online Redo Log Groups Standby Redo Log Groups (london) (boston)

1 3 2

Future Log File Groups Configuration:

Practices for Lesson 12: Performing Role Transitions

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1. Display the resulting configuration. Exit DGMGRL when done.

(host03) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: DISABLED

Configuration Status: SUCCESS

(host03) DGMGRL> **exit**

Practices for Lesson 12: Performing Role Transitions

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Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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**Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration**

**Chapter 13**

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

Chapter 13 - Page 2

**Practices for Lesson 13: Overview**

**Practices Overview**

In these practices, you will enable flashback database on both the primary database and the physical standby database.

# Practice 13-1: Configuring Flashback Database on the Primary Database

### Overview

In this practice, you will configure flashback database on the primary database and verify that it has been enabled.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch SQL\*Plus and determine the current state of flashback database.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 14:12:34

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON

NO

1. Verify that the primary database is in archive log mode, a pre-requisite to flashback database.

(host01) SQL> **archive log list**

Database log mode *Archive Mode*

Automatic archival Enabled

Archive destination USE\_DB\_RECOVERY\_FILE\_DEST Oldest online log sequence 95

Next log sequence to archive 97

Current log sequence 97

1. Verify that the fast recovery area has been configured for the primary database, a pre- requisite to flashback database.

(host01) SQL> **show parameter db\_recovery**

NAME TYPE VALUE

db\_recovery\_file\_dest

string

db\_recovery\_file\_dest\_size big integer

/u01/app/oracle

/fast\_recovery\_area

10G

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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1. Determine the current amount of time in minutes for the flashback window.

(host01) SQL> **show parameter flashback**

NAME TYPE

VALUE

db\_flashback\_retention\_target integer

1440

1. Adjust the flashback window to be 3 days (1440 minutes/day x 3 days = 4320 minutes).

(host01) SQL> **alter system set db\_flashback\_retention\_target = 4320;**

System altered.

1. Enable flashback database for the whole database.

(host01) SQL> **alter database flashback on;**

Database altered

1. Verify that flashback database has been enabled.

(host01) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON

YES

1. Determine the current size (in bytes) of the flashback data.

(host01) SQL> **select flashback\_size from v$flashback\_database\_log;**

FLASHBACK\_SIZE

104857600

1. Determine the name, quantity and sizes of the flashback log files that were created when flashback database was enabled. Your file names will be different. Exit SQL\*Plus.

(host01) SQL> **select name,bytes from v$flashback\_database\_logfile;**

NAME

BYTES

/u01/app/oracle/fast\_recovery\_area/BOSTON/flashback/o1\_mf\_9c0r52 hg\_.flb

52428800

/u01/app/oracle/fast\_recovery\_area/BOSTON/flashback/o1\_mf\_9c0r54 t7\_.flb

52428800

(host01) SQL> **exit;**

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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# Practice 13-2: Configuring Flashback Database on the Physical Standby Database

### Overview

In this practice, you will enable flashback database on the physical standby database.

### Tasks

1. Use a terminal window on host03 connected as oracle with the environment variables set to london. Launch SQL\*Plus and determine the current state of flashback database.

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 14:12:34

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON

NO

1. Verify that the physical standby database is in archive log mode, a pre-requisite to flashback database.

(host03) SQL> **archive log list**

Database log mode *Archive Mode*

Automatic archival Enabled

Archive destination USE\_DB\_RECOVERY\_FILE\_DEST Oldest online log sequence 95

Next log sequence to archive 0

Current log sequence 97

1. Verify that the fast recovery area has been configured for the physical standby database, a pre-requisite to flashback database.

(host03) SQL> **show parameter db\_recovery**

NAME TYPE VALUE

db\_recovery\_file\_dest

string

db\_recovery\_file\_dest\_size big integer

/u01/app/oracle

/fast\_recovery\_area

10G

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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1. Determine the current amount of time in minutes for the flashback window.

(host03) SQL> **show parameter flashback**

NAME TYPE

VALUE

db\_flashback\_retention\_target integer

1440

1. Adjust the flashback window to be 3 days (1440 minutes/day x 3 days = 4320 minutes).

(host03) SQL> **alter system set db\_flashback\_retention\_target = 4320;**

System altered.

1. Enable flashback database for the whole database. Note the error message that is returned.

(host03) SQL> **alter database flashback on;**

alter database flashback on

\*

ERROR at line 1:

ORA-01153: an incompatible media recovery is active

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Stop the managed recovery mode for the physical standby database.

(host01) DGMGRL> **edit database london set state='APPLY-OFF';**

Succeeded.

1. Return to the SQL\*Plus session on host03 connected to the 'london' physical standby database and enable flashback database a second time.

(host03) SQL> **alter database flashback on;**

Database altered.

1. Verify that flashback database has been enabled.

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON YES

(host03) SQL> **exit;**

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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1. Return to the terminal window on host01 that is running DGMGRL and restart the managed recovery mode for the 'london' physical standby database. Exit DGMGRL when done.

(host01) DGMGRL> **edit database london set state='APPLY-ON';**

Succeeded.

(host01) DGMGRL> **exit**

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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# Practice 13-3: Configuring Flashback Database on the Logical Standby Database

### Overview

In this practice, you will enable flashback database on the logical standby database.

### Tasks

1. Use a terminal window on host03 connected as oracle with the environment variables set to london2. Launch SQL\*Plus and determine the current state of flashback database.

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

ORACLE\_SID = [london] ? **london2**

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host03]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 14:12:34

2013

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON

NO

1. Verify that the logical standby database is in archive log mode, a pre-requisite to flashback database.

(host03) SQL> **archive log list**

Database log mode *Archive Mode*

Automatic archival Enabled

Archive destination USE\_DB\_RECOVERY\_FILE\_DEST Oldest online log sequence 86

Next log sequence to archive 88

Current log sequence 88

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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1. Verify that the fast recovery area has been configured for the physical standby database, a pre-requisite to flashback database.

(host03) SQL> **show parameter db\_recovery**

NAME TYPE VALUE

db\_recovery\_file\_dest

string

db\_recovery\_file\_dest\_size big integer

/u01/app/oracle

/fast\_recovery\_area

10G

1. Determine the current amount of time in minutes for the flashback window.
2. Adjust the flashback window to be 3 days (1440 minutes/day x 3 days = 4320 minutes).

(host03) SQL> **alter system set db\_flashback\_retention\_target = 4320;**

System altered.

(host03) SQL> **show parameter flashback**

NAME TYPE

VALUE

db\_flashback\_retention\_target integer

1440

1. Enable flashback database for the whole database. Note the error message that is returned.

(host03) SQL> **alter database flashback on;**

Database altered.

1. Verify that flashback database has been enabled.

(host03) SQL> **select flashback\_on from v$database;**

FLASHBACK\_ON YES

(host03) SQL> **exit;**

Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

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Practices for Lesson 13: Using Flashback Database in a Data Guard Configuration

Chapter 13 - Page 10

Practices for Lesson 14: Enabling Fast-Start Failover

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**Practices for Lesson 14: Enabling Fast-Start Failover**

**Chapter 14**

Practices for Lesson 14: Enabling Fast-Start Failover

Chapter 14 - Page 2

**Practices for Lesson 14: Overview**

**Practices Overview**

In these practices, you will setup and configure fast-start failover.

You will then simulate a failure of the primary database and observe the automatic failover to the standby database.

# Practice 14-1: Enabling Fast-Start Failover

### Overview

In this practice, you will enable fast-start failover on host02 where the 'bostonFS' far sync is currently running. After enabling fast-start failover, you will start the observer process.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to boston. Launch SQL\*Plus and perform a log switch on the primary database. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 14:12:34

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter system switch logfile;**

System altered.

(host01) SQL> **exit;**

1. Use a terminal window on host02 connected as oracle with the environment variables set to bostonFS. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host02]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host02) DGMGRL> **connect sysdg/oracle\_4U@bostonFS**

Connected as SYSDG.

1. Verify that there is no Transport Lag or Apply lag at the physical standby database and logical standby database before proceeding with labs.

(host02) DGMGRL> **show database london**

Database - london

Role:

Intended State: Transport Lag:

Apply Lag:

PHYSICAL STANDBY APPLY-ON

***0 seconds*** (computed 0 seconds ago)

***0 seconds*** (computed 0 seconds ago)

Practices for Lesson 14: Enabling Fast-Start Failover

Chapter 14 - Page 3

Apply Rate: 0 Byte/s Real Time Query: OFF Instance(s):

london

Database Status:

SUCCESS

(host02) DGMGRL> **show database london2**

Database - london2

Role:

Intended State: Transport Lag: Apply Lag: Apply Rate: Instance(s):

london2

LOGICAL STANDBY APPLY-ON

***0 seconds*** (computed 0 seconds ago)

***0 seconds*** (computed 0 seconds ago)

48.04 MByte/s

Database Status:

SUCCESS

1. Display the current configuration and note the current state of fast-start failover.

(host02) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxPerformance Databases:

boston - Primary database bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: ***DISABLED***

Configuration Status:

SUCCESS

Practices for Lesson 14: Enabling Fast-Start Failover

Chapter 14 - Page 4

1. Display a detailed status of the current fast-start failover settings.

(host02) DGMGRL> **show fast\_start failover**

Fast-Start Failover: DISABLED

Threshold: 30 seconds

Target: (none)

Observer: (none)

Lag Limit: 30 seconds Shutdown Primary: TRUE

Auto-reinstate: TRUE Observer Reconnect: (none) Observer Override: FALSE

Configurable Failover Conditions Health Conditions:

Corrupted Controlfile YES

Corrupted Dictionary YES

Inaccessible Logfile NO

Stuck Archiver NO

Datafile Offline YES

Oracle Error Conditions: (none)

1. Set up the FastStartFailoverTarget configuration property on the 'boston' primary database to indicate the desired 'london' target standby database.

(host02) DGMGRL> **edit database boston set property FastStartFailoverTarget = london;**

Property "faststartfailovertarget" updated

1. Display the FastStartFailoverTarget configuration property for both the primary database and the physical standby database.

(host02) DGMGRL> **show database boston faststartfailovertarget;**

FastStartFailoverTarget = 'london'

(host02) DGMGRL> **show database london FastStartFailoverTarget;**

FastStartFailoverTarget = ''

1. Modify the ObserverReconnect configuration property and set the value to 120 seconds.

(host02) DGMGRL> **edit configuration set property ObserverReconnect=120;**

Property " observerreconnect" updated

Practices for Lesson 14: Enabling Fast-Start Failover

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1. Attempt to enable fast-start failover.

(host02) DGMGRL> **enable fast\_start failover;**

Error: ORA-16693: requirements not met for enabling fast-start failover

Failed.

1. Since a far sync is being used, define the reciprocal fast-start failover target for when the 'london' physical standby database becomes the primary database. This would be set automatically by the broker if far sync was not in the configuration.

(host02) DGMGRL> **edit database london set property FastStartFailoverTarget = boston;**

Property "faststartfailovertarget" updated

1. Attempt to enable fast-start failover.

(host02) DGMGRL> **enable fast\_start failover;**

Error: ORA-16693: requirements not met for enabling fast-start failover

Failed.

1. To enable fast-start failover when using a far sync, the configuration must be upgraded to the maximum availability mode. Display the current RedoRoutes property for both the primary and standby database.

(host02) DGMGRL> **show database boston redoroutes;**

RedoRoutes = '(boston:bostonFS SYNC)'

(host02) DGMGRL> **show database london redoroutes;**

RedoRoutes = '(london:londonFS SYNC)'

**Note:** FASTSYNC would also be acceptable settings for the maximum availability.

1. Upgrade the protection mode to maximum availability.

(host02) DGMGRL> **edit configuration set protection mode as maxavailability;**

Succeeded.

1. Enable fast-start failover.

(host02) DGMGRL> **enable fast\_start failover;**

Enabled.

Practices for Lesson 14: Enabling Fast-Start Failover

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1. Display a detailed status of the current fast-start failover settings.

(host02) DGMGRL> **show fast\_start failover;**

Fast-Start Failover: ENABLED Threshold: 30 seconds

Target: london

Observer: (none)

Lag Limit: 30 seconds (not in use) Shutdown Primary: TRUE

Auto-reinstate: TRUE Observer Reconnect: 120 seconds Observer Override: FALSE

Configurable Failover Conditions Health Conditions:

Corrupted Controlfile YES

Corrupted Dictionary YES

Inaccessible Logfile NO

Stuck Archiver NO

Datafile Offline YES

Oracle Error Conditions: (none)

1. Start the observer process.

(host02) DGMGRL> **start observer**

Observer started

**Note:** The prompt will not return after starting the observer. Keep this terminal window open with the observer running in it.

Practices for Lesson 14: Enabling Fast-Start Failover

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# Practice 14-2: Testing Fast-Start Failover

### Overview

In this practice, you will simulate a disaster on the primary database and observe the automatic failover to the standby database.

### Tasks

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the primary database using SQL\*Plus and simulate a failure by issuing the shutdown abort command. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 22:40:27

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **shutdown abort**

ORACLE instance shut down.

(host01) SQL> **exit;**

1. Observe the status output in the terminal session connected to host02 running the observer process from the previous lab step. It may take a minute before the failover is initiated.

(host02) DGMGRL> **start observer**

Observer started

12:59:51.40 Wednesday, December 18, 2013

Initiating Fast-Start Failover to database "london"... Performing failover NOW, please wait...

Failover succeeded, new primary is "london" 13:01:19.70 Wednesday, December 18, 2013

13:01:23.64 Wednesday, December 18, 2013 Initiating reinstatement for database "london2"... Reinstating database "london2", please wait...

Operation requires shutdown of instance "london2" on database "london2"

Shutting down instance "london2"... Database closed.

Database dismounted.

ORACLE instance shut down.

Practices for Lesson 14: Enabling Fast-Start Failover

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Operation requires startup of instance "london2" on database "london2"

Starting instance "london2"... ORACLE instance started.

Database mounted.

Continuing to reinstate database "london2" ...

Operation requires shutdown of instance "london2" on database "london2"

Shutting down instance "london2"... ORA-01109: database not open

Database dismounted. ORACLE instance shut down.

Operation requires startup of instance "london2" on database "london2"

Starting instance "london2"... ORACLE instance started.

Database mounted.

Continuing to reinstate database "london2" ... Reinstatement of database "london2" succeeded

13:04:04.71 Wednesday, December 18, 2013

1. Use a terminal window on host03 connected as oracle with the environment variables set to london. Launch the DGMGRL utility and connect as the sysdg user with operating system authentication.

[oracle@host03]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host03) DGMGRL> **connect sysdg/oracle\_4U@london**

Connected as SYSDG.

1. Display the current configuration and note the current state of fast-start failover.

(host03) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

london - Primary database londonFS - Far Sync

boston - (\*) Physical standby database (disabled)

ORA-16661: the standby database needs to be reinstated

london2 - Logical standby database

Practices for Lesson 14: Enabling Fast-Start Failover

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Warning: ORA-16857: standby disconnected from redo source for longer than specified threshold

bostonFS - Far Sync (inactive)

Fast-Start Failover: ENABLED

Configuration Status: WARNING

**Note:** The ORA-16857 warning message depends on the lag and overall performance of the virtual machine environment. You may or may not see this warning statement. It is a matter of timing.

1. Use a terminal window on host01 connected as oracle with the environment variables set to 'boston'. Connect to the former primary database (the new physical standby database) using SQL\*Plus and mount the 'boston' database. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Tue Dec 17 22:40:27

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to an idle instance.

(host01) SQL> **startup mount**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

(host01) SQL> **exit;**

1. Observe the output in the terminal session on host02 running the observer process.

Initiating reinstatement for database "boston"... Reinstating database "boston", please wait...

Reinstatement of database "boston" succeeded

13:10:41.54 Wednesday, December 18, 2013

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1. Return to the DGMGRL session running on host03 and display the configuration.

(host03) DGMGRL> **show configuration**

Configuration - DRSolution Protection Mode: MaxAvailability Databases:

london - Primary database londonFS - Far Sync

boston - (\*) Physical standby database

Warning: ORA-16857: standby disconnected from redo source for longer than specified threshold

london2 - Logical standby database bostonFS - Far Sync (inactive)

Fast-Start Failover: ENABLED

Configuration Status: WARNING

**Note:** The ORA-16857 warning message depends on the lag and overall performance of the virtual machine environment. You may or may not see this warning statement. It is a matter of timing.

1. It may take a few moments for the lag for the standby database to clear. Keep displaying the status until it has cleared. Do not continue with labs until the apply lag and transport lag have cleared.

(host03) DGMGRL> **show database boston**

Database - boston

Role: PHYSICAL STANDBY

Intended State: APPLY-ON

Transport Lag: 0 seconds (computed 1 second ago) Apply Lag: 0 seconds (computed 1 second ago) Apply Rate: 0 Byte/s

Real Time Query: OFF Instance(s):

boston

Database Status:

SUCCESS

(host03) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

SUCCESS

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Practices for Lesson 14: Enabling Fast-Start Failover

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# Practice 14-3: Switchover to Reinstated Database

### Overview

In this practice, you will perform a switchover to return the configuration to the state that it was before the failover.

### Tasks

1. Validate that the 'london' primary database is ready for switchover.

(host03) DGMGRL> **validate database london**

Database Role: Primary database Ready for Switchover: ***Yes***

1. Validate that the 'boston' standby database is ready for switchover.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Thread # | Online Redo  (boston) | Log | Groups | Standby Redo Log  (london) | Groups |
| 1 | 3 |  |  | 2 |  |

1. Switchover to the 'boston' database.

(host03) DGMGRL> **switchover to boston**

Performing switchover NOW, please wait...

Operation requires a connection to instance "boston" on database "boston"

Connecting to instance "boston"... Connected as SYSDG.

New primary database "boston" is opening...

Operation requires startup of instance "london" on database "london"

Starting instance "london"... ORACLE instance started.

Database mounted.

Switchover succeeded, new primary is "boston"

(host03) DGMGRL> **validate database boston**

Database Role: Physical standby database Primary Database: london

Ready for Switchover: ***Yes***

Ready for Failover: Yes (Primary Running)

Current Log File Groups Configuration:

Thread # Online Redo Log Groups Standby Redo Log Groups (london) (boston)

1 3 2

Future Log File Groups Configuration:

Practices for Lesson 14: Enabling Fast-Start Failover

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1. Display the resulting configuration.

(host03) DGMGRL> **show configuration**

Configuration - DRSolution

Protection Mode: MaxAvailability Databases:

boston - Primary database bostonFS - Far Sync

london - (\*) Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: ENABLED

Configuration Status:

SUCCESS

1. Stop the observer process.

(host03) DGMGRL> **stop observer**

Done.

**Note:** The prompt should now be returned in the terminal window that was connected to host02 running the observer process.

1. Disable fast-start failover.

(host03) DGMGRL> **disable fast\_start failover;**

Disabled.

1. Reset the protection mode back to maximum performance and exit DGMGRL.

(host03) DGMGRL> **edit configuration set protection mode as maxperformance;**

Succeeded.

DGMGRL> **exit;**

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Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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**Practices for Lesson 15: Backup and Recovery Considerations an Oracle Data Guard Configuration**

**Chapter 15**

# Practices for Lesson 15: Overview

### Practices Overview

In these practices, you will setup and configure the recovery manager (RMAN) catalog repository database and use it to perform backup and recovery in a Data Guard environment.

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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# Practice 15-1: Creating a Recovery Manager Catalog

### Overview

In this practice, you will setup and configure the recovery manager (RMAN) catalog repository database.

### Tasks

1. Open a new terminal window on Domain 0 as was done in the first lab. Switch to the root user and list the virtual machines that are currently running.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| [vncuser@Domain0]$ **su -**  Password: **oracle** | | | | | | |
| [root@Domain0]# | **xm** | **list** |  |  |  |  |
| Name |  | ID | Mem | VCPUs | State | Time(s) |
| Domain-0 |  | 0 | 1024 | 2 | r----- | 15367.0 |
| host01 |  | 7 | 2048 | 1 | -b---- | 767.4 |
| host02 |  | 8 | 1536 | 1 | -b---- | 532.4 |
| host03 |  | 9 | 2048 | 1 | -b---- | 1464.9 |
| host04 |  | 10 | 1536 | 1 | -b---- | 535.4 |

1. Start the 'em12' virtual machine.

[root@Domain0]# **xm create /OVS/running\_pool/em12/vm.cfg**

Using config file "/OVS/running\_pool/em12/vm.cfg". Started domain em12 (id=11)

**Note:** Even though the prompt is returned quickly, it will take a minute for the operating system for virtual machine 'em12' to start networking services and allow connectivity.

1. Using the SSH client, connect to em12 as the oracle OS user. Enter oracle when you are prompted for the password. In the lab environment, always use the -X option of SSH to enable X11 forwarding back to the Domain-0 console window.

[root@dom0]# **ssh -X oracle@em12**

oracle@em12's password: **oracle**

1. Since Enterprise Manager Cloud Control 12*c* is installed on em12, startup scripts were created to automatically start EM when the operating system starts. Stop the EM agent and the EM Management Server. Exit the terminal session and close the window when done.

[oracle@em12]$ **cd /u01/app/oracle/agent/agent\_inst/bin**

[oracle@em12]$ **./emctl stop agent**

Oracle Enterprise Manager Cloud Control 12c Release 3

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Agent is Not Running

[oracle@em12]$ **cd /u01/app/oracle/middleware/oms/bin**

[oracle@em12]$ **./emctl stop oms -all**

Oracle Enterprise Manager Cloud Control 12c Release 3

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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Stopping WebTier...

WebTier Successfully Stopped Stopping Oracle Management Server...

Oracle Management Server Successfully Stopped AdminServer Successfully Stopped

Oracle Management Server is Down

[oracle@em12]$ **exit**

logout

Connection to em12 closed.

[root@dom0]# **exit** <<You may leave the terminal window open>> [vncuser@Domain0]$ **exit**

1. On host01, invoke SQL\*Plus and connect as the SYS user with the SYSDBA privilege to the emrep service.

[oracle@host01 admin]$ **sqlplus sys/oracle\_4U@emrep as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Dec 18 15:10:17

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production

With the Partitioning, OLAP, Data Mining and Real Application Testing options

1. Determine where the current data files are stored at.

(host01) SQL> **select file\_name from dba\_data\_files;**

FILE\_NAME

/u01/app/oracle/oradata/emrep/users01.dbf

/u01/app/oracle/oradata/emrep/undotbs01.dbf

/u01/app/oracle/oradata/emrep/sysaux01.dbf

/u01/app/oracle/oradata/emrep/system01.dbf

/u01/app/oracle/oradata/emrep/mgmt\_ecm\_depot1.dbf

/u01/app/oracle/oradata/emrep/mgmt.dbf

/u01/app/oracle/oradata/emrep/mgmt\_deepdive.dbf

7 rows selected.

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1. Create a new tablespace for the recovery manager repository using the same storage architecture as the existing files. Name the tablesace 'rcts' and give it an initial size of 30MB with autoextend turned on.

(host01) SQL> **create tablespace rcts datafile '/u01/app/oracle/oradata/emrep/rcts01.dbf' size 30M autoextend on;**

Tablespace created.

1. Create a new schema 'rcowner' setting the default tablespace to the tablespace just created.

(host01) SQL> **create user rcowner identified by rcpass default tablespace rcts quota unlimited on rcts;**

User created.

1. Grant the recovery catalog owner role to the user just created. Exit SQL\*Plus when done.

(host01) SQL> **grant recovery\_catalog\_owner to rcowner;**

Grant succeeded.

(host01) SQL> **exit**

1. On host01, invoke recovery manager and connect to the emrep service using the account just created.

[oracle@host01]$ **rman**

Recovery Manager: Release 12.1.0.1.0 - Production on Wed Dec 18 15:25:35 2013

Copyright (c) 1982, 2013, Oracle and/or its affiliates. All rights reserved.

(host01) RMAN> **connect catalog rcowner/rcpass@emrep**

connected to recovery catalog database

1. Create the recovery catalog.

(host01) RMAN> **create catalog;**

recovery catalog created

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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# Practice 15-2: Registering Your Database in the Recovery Catalog

### Overview

In this practice, you register the primary database in the recovery catalog.

### Tasks

1. Connect to the 'boston' primary database with SYSDBA privilege and register the database.

(host01) RMAN> **connect target 'sys/oracle\_4U@boston as sysdba'**

connected to target database: BOSTON (DBID=2524687871)

(host01) RMAN> **register database;** database registered in recovery catalog starting full resync of recovery catalog

full resync complete

**Note:** Your DBID should be different.

1. List the DB\_UNIQUE\_NAME for all databases known to the recovery catalog.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (host01) RMAN> **list db\_unique\_name of database;** | | | | | | | |
| List of DB Key |  | Databases DB Name | DB ID |  | Database Role |  | Db\_unique\_name |
| 1 BOSTON 2524687871 PRIMARY BOSTON | | | | | | | |

1. Generate a schema report for the 'boston' primary database.

(host01) RMAN> **report schema for db\_unique\_name boston;**

Report of database schema for database with db\_unique\_name BOSTON

List of Permanent Datafiles

===========================

File Size(MB) Tablespace

RB segs

Datafile Name

1

800

SYSTEM

YES

/u01/app/oracle/oradata/boston/system01.dbf

1. 780 SYSAUX NO

/u01/app/oracle/oradata/boston/sysaux01.dbf

1. 345 UNDOTBS1 YES

/u01/app/oracle/oradata/boston/undotbs01.dbf

1. 260 PDB$SEED:SYSTEM NO

/u01/app/oracle/oradata/boston/pdbseed/system01.dbf

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* 1. 5 USERS NO

/u01/app/oracle/oradata/boston/users01.dbf

* 1. 640 PDB$SEED:SYSAUX NO

/u01/app/oracle/oradata/boston/pdbseed/sysaux01.dbf

* 1. 290 DEV1:SYSTEM NO

/u01/app/oracle/oradata/boston/dev1/system01.dbf

* 1. 700 DEV1:SYSAUX NO

/u01/app/oracle/oradata/boston/dev1/sysaux01.dbf

* 1. 5 DEV1:USERS NO

/u01/app/oracle/oradata/boston/dev1/SAMPLE\_SCHEMA\_users01.dbf

* 1. 358 DEV1:EXAMPLE NO

/u01/app/oracle/oradata/boston/dev1/example01.dbf

List of Temporary Files

=======================

File Size(MB) Tablespace Maxsize(MB) Tempfile Name

---

1 88 TEMP 32767

/u01/app/oracle/oradata/boston/temp01.dbf

2 87 PDB$SEED:TEMP 32767

/u01/app/oracle/oradata/boston/pdbseed/pdbseed\_temp01.dbf

3 87 DEV1:TEMP 32767

/u01/app/oracle/oradata/boston/dev1/dev1\_temp01.dbf

1. List all the archive logs for the 'boston' primary database.

(host01) RMAN> **list archivelog all for db\_unique\_name boston;**

List of Archived Log Copies for database with db\_unique\_name BOSTON

================================================================

=====

Key

Thrd Seq

S Low Time

-

**…**

202

1

Name:

71

A 18-DEC-13

/u01/app/oracle/fast\_recovery\_area/BOSTON/archivelog/2013\_12\_18/ o1\_mf\_1\_71\_9c32odc2\_.arc

203

1

Name:

72

A 18-DEC-13

/u01/app/oracle/fast\_recovery\_area/BOSTON/archivelog/2013\_12\_18/ o1\_mf\_1\_72\_9c32p1r2\_.arc

204

1

73

A 18-DEC-13

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Name:

/u01/app/oracle/fast\_recovery\_area/BOSTON/archivelog/2013\_12\_18/ o1\_mf\_1\_73\_9c36xrwt\_.arc

205

1

Name:

74

A 18-DEC-13

/u01/app/oracle/fast\_recovery\_area/BOSTON/archivelog/2013\_12\_18/ o1\_mf\_1\_74\_9c36yy2d\_.arc

**…**

1. Display all the current configuration parameters for the 'boston' primary database.

(host01) RMAN> **show all for db\_unique\_name boston;**

RMAN configuration parameters for database with db\_unique\_name BOSTON are:

CONFIGURE RETENTION POLICY TO REDUNDANCY 1; # default CONFIGURE BACKUP OPTIMIZATION OFF; # default CONFIGURE DEFAULT DEVICE TYPE TO DISK; # default CONFIGURE CONTROLFILE AUTOBACKUP ON; # 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 RMAN OUTPUT TO KEEP FOR 7 DAYS; # default

CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # default CONFIGURE SNAPSHOT CONTROLFILE NAME TO

'/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/snapcf\_boston.f'; # default

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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# Practice 15-3: Configuring RMAN Parameters

### Overview

In this practice, you will configure RMAN for use in a Data Guard environment.

### Tasks

1. In your RMAN session (connected to your primary database), configure the backup retention policy to allow for recovery for seven days.

(host01) RMAN> **configure retention policy to recovery window of**

**7 days;**

new RMAN configuration parameters:

CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 7 DAYS;

new RMAN configuration parameters are successfully stored starting full resync of recovery catalog

full resync complete

1. Specify that archived redo log files can be deleted after they are applied to the standby database.

(host01) RMAN> **configure archivelog deletion policy to applied on all standby;**

new RMAN configuration parameters:

CONFIGURE ARCHIVELOG DELETION POLICY TO APPLIED ON ALL STANDBY;

new RMAN configuration parameters are successfully stored starting full resync of recovery catalog

full resync complete

1. Configure the connect identifier for your primary database.

(host01) RMAN> **configure db\_unique\_name boston connect identifier 'boston';**

new RMAN configuration parameters:

CONFIGURE DB\_UNIQUE\_NAME 'boston' CONNECT IDENTIFIER 'boston';

new RMAN configuration parameters are successfully stored starting full resync of recovery catalog

full resync complete

1. Configure the connect identifier for your physical standby database.

(host01) RMAN> **configure db\_unique\_name london connect identifier 'london';**

new RMAN configuration parameters:

CONFIGURE DB\_UNIQUE\_NAME 'london' CONNECT IDENTIFIER 'london';

new RMAN configuration parameters are successfully stored starting full resync of recovery catalog

full resync complete

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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1. Your physical standby database is registered with the recovery catalog. Use the LIST DB\_UNIQUE\_NAME command to see the registration information about your primary and standby databases.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (host01) RMAN> **list db\_unique\_name of database;** | | | | | | | | |
| List of DB Key |  | Databases DB Name | DB ID |  | Database | Role |  | Db\_unique\_name |
| 1 |  | BOSTON | 2524687871 |  | PRIMARY |  |  | BOSTON |
| 1 |  | BOSTON | 2524687871 |  | STANDBY |  |  | LONDON |

1. Use the REPORT SCHEMA command to view additional information about your physical standby database. Exit RMAN when done.

(host01) RMAN> **report schema for db\_unique\_name london;**

Report of database schema for database with db\_unique\_name LONDON

List of Permanent Datafiles

===========================

File Size(MB) Tablespace RB segs Datafile Name

1 800

3 770

4 345

5 260

6 5

7 640

8 290

9 700

10 5

11 358

SYSTEM SYSAUX UNDOTBS1

PDB$SEED:SYSTEM USERS PDB$SEED:SYSAUX DEV1:SYSTEM DEV1:SYSAUX DEV1:USERS

DEV1:EXAMPLE

YES NO YES NO NO NO NO NO NO

NO

(host01) RMAN> **exit;**

1. Invoke RMAN again and connect to your physical standby database and the recovery catalog.

[oracle@host01]$ **rman target sys/oracle\_4U@london catalog rcowner/rcpass@emrep**

Recovery Manager: Release 12.1.0.1.0 - Production on Wed Dec 18 16:04:49 2013

Copyright (c) 1982, 2013, Oracle and/or its affiliates. All rights reserved.

connected to target database: BOSTON (DBID=2524687871, not open)

connected to recovery catalog database

**Note:** Notice that the database name is listed as BOSTON, even though a connection was made to the 'london' physical standby instance.

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1. Execute the SHOW ALL command to view the configuration parameters for your physical standby database.

(host01) RMAN> **show all for db\_unique\_name london;**

RMAN configuration parameters for database with db\_unique\_name LONDON are:

CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 7 DAYS; CONFIGURE BACKUP OPTIMIZATION OFF; # default

CONFIGURE DEFAULT DEVICE TYPE TO DISK; # default CONFIGURE CONTROLFILE AUTOBACKUP ON; # 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 DB\_UNIQUE\_NAME 'boston' CONNECT IDENTIFIER 'boston'; CONFIGURE DB\_UNIQUE\_NAME 'london' CONNECT IDENTIFIER 'london'; CONFIGURE RMAN OUTPUT TO KEEP FOR 7 DAYS; # default

CONFIGURE ARCHIVELOG DELETION POLICY TO APPLIED ON ALL STANDBY;

CONFIGURE SNAPSHOT CONTROLFILE NAME TO

'/u01/app/oracle/product/12.1.0/dbhome\_1/dbs/snapcf\_london.f'; # default

1. Configure backup optimization. Exit RMAN when done.

(host01) RMAN> **configure backup optimization on;**

new RMAN configuration parameters:

CONFIGURE BACKUP OPTIMIZATION ON;

new RMAN configuration parameters are successfully stored

(host01) RMAN> **exit;**

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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# Practice 15-4: Recovering a Data File on Your Primary Database

### Overview

In this practice, you recover a data file in your primary database by using a data file from your physical standby database. You will create a new data file in order to simulate a disaster, without affecting the existing data files on the primary database.

### Tasks

1. The logical standby database does not honor the DB\_FILE\_NAME\_CONVERT parameter. This will cause an error when a tablespace is created on the primary database and force the Logical Apply process to shutdown because the directory doesn't exit. Use a terminal window logged in as oracle to host03. Create a symbolic link 'boston' linking to 'london2' so that file creation can proceed.

[oracle@host03]$ **cd /u01/app/oracle/oradata**

[oracle@host03]$ **ln -s london2 boston**

**Note:** The Data Guard documentation shows how to create a DDL handler using a procedure, along with the built-in DBMS\_LOGSTDBY.SKIP procedure to skip over the DDL with the wrong path names and invoke the handler to rename the path in the command.

1. Use a terminal window logged in as oracle to host01 to with the environment variables set for 'boston' appropriately. Launch SQL\*Plus and create a new tablespace SAMPLE in the DEV1 pluggable database with a data file

/u01/app/oracle/oradata/boston/dev1/sample01.dbf and a size of 5 MB.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Wed Dec 18 16:23:20

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter session set container=DEV1;**

Session altered.

(host01) SQL> **create tablespace SAMPLE datafile '/u01/app/oracle/oradata/boston/dev1/sample01.dbf' size 5M;**

Tablespace created.

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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1. Connect to your physical standby instance as the SYSDBA user and show the

standby\_file\_management parameter.

(host01) SQL> **connect sys/oracle\_4U@london as sysdba**

Connected.

(host01) SQL> **show parameter standby\_file\_management**

NAME TYPE VALUE

standby\_file\_management

string

AUTO

1. Verify that the data file has successfully been created on the physical standby database.

(host01) SQL> **select file#,name from v$datafile;**

FILE# NAME

1 /u01/app/oracle/oradata/london/system01.dbf

1. /u01/app/oracle/oradata/london/sysaux01.dbf
2. /u01/app/oracle/oradata/london/undotbs01.dbf
3. /u01/app/oracle/oradata/london/pdbseed/system01.dbf
4. /u01/app/oracle/oradata/london/users01.dbf
5. /u01/app/oracle/oradata/london/pdbseed/sysaux01.dbf
6. /u01/app/oracle/oradata/london/dev1/system01.dbf
7. /u01/app/oracle/oradata/london/dev1/sysaux01.dbf

10

/u01/app/oracle/oradata/london/dev1/SAMPLE\_SCHEMA\_users01.dbf

1. /u01/app/oracle/oradata/london/dev1/example01.dbf
2. /u01/app/oracle/oradata/london/dev1/sample01.dbf

11 rows selected.

1. Connect to your logical standby instance as the SYSDBA user.

(host01) SQL> **connect sys/oracle\_4U@london2 as sysdba**

Connected.

1. Verify that the data file has successfully been created on the logical standby database.

(host01) SQL> **select file#,name from v$datafile;**

FILE# NAME

1 /u01/app/oracle/oradata/london2/system01.dbf

1. /u01/app/oracle/oradata/london2/sysaux01.dbf
2. /u01/app/oracle/oradata/london2/undotbs01.dbf
3. /u01/app/oracle/oradata/london2/pdbseed/system01.dbf
4. /u01/app/oracle/oradata/london2/users01.dbf
5. /u01/app/oracle/oradata/london2/pdbseed/sysaux01.dbf
6. /u01/app/oracle/oradata/london2/dev1/system01.dbf
7. /u01/app/oracle/oradata/london2/dev1/sysaux01.dbf

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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10

/u01/app/oracle/oradata/london/dev1/SAMPLE\_SCHEMA\_users01.dbf

1. /u01/app/oracle/oradata/london2/dev1/example01.dbf
2. /u01/app/oracle/oradata/boston/dev1/sample01.dbf
3. Reconnect to your primary database and create the hr.employees2 table as a copy of the hr.employees table into the newly created tablespace. Exit SQL\*Plus

(host01) SQL> **connect system/oracle\_4U@//host01.example.com/DEV1.example.com**

Connected.

(host01) SQL> **create table hr.employees2 tablespace sample as select \* from hr.employees;**

Table created.

**Note:** A service name was never created for the DEV1 pluggable database. The connection above uses the EZCONNECT method to directly connect to the DEV1 pluggable database without having an entry in the TNSNAMES.ORA file. It connects without having to connect to the CDB$ROOT container first and issue the 'alter session set container = DEV1;' command. Also of interest, the HR account is currently expired and locked.

1. Verify that the table was created by counting the number of rows it contains.

(host01) SQL> **select count(\*) from hr.employees2;**

COUNT(\*)

107

1. Move the sample01.dbf file to sample01.sav to simulate a failure in the primary database.

(host01) SQL> **!mv**

**/u01/app/oracle/oradata/boston/dev1/sample01.dbf**

**/u01/app/oracle/oradata/boston/dev1/sample01.sav**

1. Connect to the root container and shutdown abort the primary database. Exit SQL\*Plus.

(host01) SQL> **connect sys/oracle\_4U@boston as sysdba**

Connected.

(host01) SQL> **shutdown abort**

ORACLE instance shut down.

(host01) SQL> **exit**

1. Use a terminal window logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch SQL\*Plus and start the database instance. Exit SQL\*Plus.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Jan 17 17:44:40

2014

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Connected to an idle instance.

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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(host01) SQL> **startup**

ORACLE instance started.

Total System Global Area 517763072 bytes Fixed Size 2290216 bytes Variable Size 440405464 bytes

Database Buffers 71303168 bytes

Redo Buffers 3764224 bytes Database mounted.

ORA-01157: cannot identify/lock data file 12 - see DBWR trace file

ORA-01110: data file 12: '/u01/app/oracle/oradata/boston/dev1/sample01.dbf'

1. Since the datafile belongs to a non-critical tablespace such as SYSTEM, offline the datafile and open the database. You will need to change to the DEV1 container where the tablespace was created at in order to offline it. Exit SQL\*Plus.

(host01) SQL> **alter session set container=dev1;**

Session altered.

(host01) SQL> **alter tablespace sample datafile offline;**

Tablespace altered.

(host01) SQL> alter **session set container=CDB$ROOT;**

Session altered.

(host01) SQL> **alter database open;**

Database altered.

(host01) SQL> **show pdbs**

CON\_ID CON\_NAME

OPEN MODE RESTRICTED

1. PDB$SEED
2. DEV1

READ ONLY NO

MOUNTED

(host01) SQL> **alter pluggable database dev1 open;**

Pluggable database altered.

(host01) SQL> **show pdbs**

CON\_ID CON\_NAME

OPEN MODE RESTRICTED

1. PDB$SEED
2. DEV1

READ ONLY NO

READ WRITE NO

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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(host01) SQL> **exit**

1. Use RMAN to restore the missing datafile using the physical standby database. You will need to connect to the physical standby database as the target database, and to the primary database as the auxiliary database. Exit RMAN.

[oracle@host01]$ **rman**

Recovery Manager: Release 12.1.0.1.0 - Production on Fri Dec 20 14:20:37 2013

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(host01) RMAN> **connect target sys/oracle\_4U@london**

connected to target database: BOSTON (DBID=2524687871)

(host01) RMAN> **connect auxiliary sys/oracle\_4U@boston**

connected to auxiliary database: BOSTON (DBID=2524687871)

#### (host01) RMAN> backup as copy datafile 12 auxiliary format '/u01/app/oracle/oradata/boston/dev1/sample01.bkp';

Starting backup at 20-DEC-13

using target database control file instead of recovery catalog allocated channel: ORA\_DISK\_1

channel ORA\_DISK\_1: SID=43 device type=DISK channel ORA\_DISK\_1: starting datafile copy

input datafile file number=00012 name=/u01/app/oracle/oradata/london/dev1/sample01.dbf

output file name=/u01/app/oracle/oradata/boston/dev1/sample01.bkp tag=TAG20140117T174920

channel ORA\_DISK\_1: datafile copy complete, elapsed time: 00:00:01

Finished backup at 20-DEC-13

(host01) RMAN> **exit**

1. Use RMAN with connections to the primary database as the target database and also the recovery catalog. Catalog the copy of the datafile just made so that RMAN is aware of the manual backup.

[oracle@host01]$ **rman target sys/oracle\_4U@boston catalog rcowner/rcpass@emrep;**

Recovery Manager: Release 12.1.0.1.0 - Production on Fri Dec 20 14:27:34 2013

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connected to target database: BOSTON (DBID=2524687871)

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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connected to recovery catalog database

(host01) RMAN> **catalog datafilecopy '/u01/app/oracle/oradata/boston/dev1/sample01.bkp';**

starting full resync of recovery catalog full resync complete

cataloged datafile copy

datafile copy file name=/u01/app/oracle/oradata/boston/dev1/sample01.bkp RECID=11 STAMP=834676134

1. Rename the existing datafile 12 to the new name, switch the control file to use the new file, and recover the file. Exit RMAN.

RMAN> **run {**

**set newname for datafile 12 to '/u01/app/oracle/oradata/boston/dev1/sample01.bkp';**

**switch datafile 12;**

**recover datafile 12;**

**}**

executing command: SET NEWNAME

RMAN-06169: could not read file header for datafile 12 error reason 4

datafile 12 switched to datafile copy

input datafile copy RECID=11 STAMP=834676134 file name=/u01/app/oracle/oradata/boston/dev1/sample01.bkp

starting full resync of recovery catalog full resync complete

Starting recover at 20-DEC-13 allocated channel: ORA\_DISK\_1

channel ORA\_DISK\_1: SID=81 device type=DISK starting media recovery

media recovery complete, elapsed time: 00:00:01 Finished recover at 20-DEC-13

(host01) RMAN> **exit**

1. Use a terminal window logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch SQL\*Plus and switch the container to the pluggable database. Online the files for the tablespace 'EXAMPLE2.' Verify that the table has been recovered and the rows exist in the table.

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Dec 20 14:34:56

2013

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Connected to:

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter session set container=DEV1;**

Session altered.

(host01) SQL> **alter tablespace sample datafile online;**

Tablespace altered.

(host01) SQL> **select \* from hr.employees2;**

…

EMPLOYEE\_ID FIRST\_NAME LAST\_NAME

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| EMAIL SALARY |  | PHONE\_NUMBER |  | HIRE\_DATE |  | JOB\_ID |
|  |  |  |  |  |  |  |
| COMMISSION\_PCT MANAGER\_ID |  | DEPARTMENT\_ID |  |  |  |  |
| 205 Shelley |  | Higgins |  |  |  |  |
| SHIGGINS 12008 |  | 515.123.8080 |  | 07-JUN-02 |  | AC\_MGR |
| 101 |  | 110 |  |  |  |  |
| 206 William |  | Gietz |  |  |  |  |
| WGIETZ  AC\_ACCOUNT 8300 |  | 515.123.8181 |  | 07-JUN-02 |  |  |
| 205 |  | 110 |  |  |  |  |
| EMPLOYEE\_ID FIRST\_NAME |  | LAST\_NAME |  |  |  |  |
| EMAIL SALARY |  | PHONE\_NUMBER |  | HIRE\_DATE |  | JOB\_ID |
|  |  |  |  |  |  |  |
| COMMISSION\_PCT MANAGER\_ID |  | DEPARTMENT\_ID |  |  |  |  |

107 rows selected.

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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1. Use the online datafile move command to rename the newly created datafile back to the old name.

(host01) SQL> **alter database move datafile '/u01/app/oracle/oradata/boston/dev1/sample01.bkp' TO '/u01/app/oracle/oradata/boston/dev1/sample01.dbf';**

Database altered.

**Note:** The online move operation does not move (or rename) the datafile on the standby sites.

1. Drop the tablespace that was created in the lab along with the datafiles. Exit SQL\*Plus.

(host01) SQL> **drop tablespace sample including contents and datafiles;**

Tablespace dropped;

(host01) SQL> **exit**

Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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Practices for Lesson 15: Backup and Recovery Considerations in an Oracle Data Guard Configuration

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Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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**Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment**

**Chapter 16**

# Practices for Lesson 16: Overview

### Practices Overview

In these practices, you will create a service to connect to the DEV1 pluggable database, and also create a database startup trigger that will start the service on any host machine that the primary database is running on.

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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# Practice 16-1: Creating and Testing Primary Database Services

### Overview

In this practice, you will create and test a service for the DEV1 pluggable database on the primary database, and follow that service as it migrates from host01 to host03 during switchover exercises.

### Tasks

1. Use a terminal window logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch SQL\*Plus and set the session container to the DEV1 pluggable database.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [boston] ?

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host01]$ **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Jan 17 18:29:14

2014

Copyright (c) 1982, 2013, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **alter session set container=dev1;**

Session altered.

1. Create and start a service with the name 'PRMY.EXAMPLE.COM'.

(host01) SQL> **exec DBMS\_SERVICE.CREATE\_SERVICE('PRMY.EXAMPLE.COM','PRMY.EXAMPLE.COM ');**

PL/SQL procedure successfully completed.

(host01) SQL> **exec DBMS\_SERVICE.START\_SERVICE('PRMY.EXAMPLE.COM');**

PL/SQL procedure successfully completed.

1. From within SQL\*Plus, display the status of the Oracle listener running on host01 and verify that the service was started successfully. Do not exit SQL\*Plus.

(host01) SQL> **!lsnrctl status**

LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 20-DEC- 2013 16:06:01

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Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=host01.example.com)(PO RT=1521)(SEND\_SDU=10485760)(RECV\_SDU=10485760)))

STATUS of the LISTENER

Alias LISTENER

Version TNSLSNR for Linux: Version 12.1.0.1.0

- Production

Start Date 18-DEC-2013 10:25:42

Uptime 2 days 5 hr. 40 min. 21 sec

Trace Level off

Security ON: Local OS Authentication

SNMP OFF

Listener Parameter File

/u01/app/oracle/product/12.1.0/dbhome\_1/network/admin/listener.o ra

Listener Log File

/u01/app/oracle/diag/tnslsnr/host01/listener/alert/log.xml Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=host01.example.com)(PO RT=1521)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=EXTPROC1521)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=host01.example.com)(P

ORT=5500))(Security=(my\_wallet\_directory=/u01/app/oracle/admin/b oston/xdb\_wallet))(Presentation=HTTP)(Session=RAW))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=host01.example.com)(P

ORT=5501))(Security=(my\_wallet\_directory=/u01/app/oracle/admin/b oston/xdb\_wallet))(Presentation=HTTP)(Session=RAW))

Services Summary...

##### Service "PRMY.EXAMPLE.COM" has 1 instance(s).

***Instance "boston", status READY, has 1 handler(s) for this service...***

Service "boston.example.com" has 2 instance(s).

Instance "boston", status UNKNOWN, has 1 handler(s) for this service...

Instance "boston", status READY, has 1 handler(s) for this service...

Service "bostonXDB.example.com" has 1 instance(s).

Instance "boston", status READY, has 0 handler(s) for this service...

Service "boston\_DGB.example.com" has 1 instance(s).

Instance "boston", status READY, has 1 handler(s) for this service...

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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Service "boston\_DGMGRL.example.com" has 1 instance(s).

Instance "boston", status UNKNOWN, has 1 handler(s) for this service...

Service "dev1.example.com" has 1 instance(s).

Instance "boston", status READY, has 1 handler(s) for this service...

The command completed successfully

1. Use another terminal window logged in as oracle to host02 to with the environment variables set for 'bostonFS' appropriately. Launch SQL\*Plus and connect to the PRMY.EXAMPLE.COM service.

[oracle@host02]$ **. oranev**

ORACLE\_SID = [bostonFS] ?

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host02]$ **sqlplus system/oracle\_4U@prmy**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Dec 20 15:19:40

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Last Successful login time: Fri Dec 20 2013 14:02:22 +00:00 Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

**Note:** The tnsnames.ora network configuration file was created in practice 3, with an entry 'PRMY' that attempts to connect to both host01.example.com and host03.example.com, and access a service name of 'PRMY.EXAMPLE.COM'.

1. Verify that you are indeed connected to the 'boston' instance (the primary database).

(host02) SQL> **select instance\_name from v$instance;**

INSTANCE\_NAME

boston

1. Verify that your connection has been established with the DEV1 pluggable database and not the root container. Exit SQL\*Plus.

(host02) SQL> **select sys\_context ('USERENV', 'CON\_NAME') as container FROM dual;**

CONTAINER DEV1

(host02) **exit**

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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1. Return to the SQL\*Plus session running on host01 for the primary database. Create an on database startup trigger that will open the DEV1 pluggable database if it is not already open. The trigger should then start the 'PRMY.EXAMPLE.COM' service after it switches the container to the DEV1 container. The logic should only execute if the database is in the primary role. Exit SQL\*Plus on host01.

(host**01**) SQL> **create or replace trigger primary\_services after startup on database**

**declare**

**role varchar2(30); omode varchar2(30);**

**begin**

**select database\_role into role from v$database;**

**select open\_mode into omode from v$pdbs where name = 'DEV1'; if role = 'PRIMARY' then**

**if omode != 'READ WRITE' then**

**execute immediate 'alter pluggable database dev1 open'; end if;**

**execute immediate 'alter session set container=dev1'; dbms\_service.start\_service('PRMY.EXAMPLE.COM');**

**end if; end;**

**/**

Trigger created. (host01) SQL> **exit**

1. Use a terminal window logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch DGMGRL and connect to the sysdg account. Show the configuration.

[oracle@host01]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host01) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

(host01) DGMGRL> **show configuration**

Configuration - DRSolution Protection Mode: MaxPerformance Databases:

boston - Primary database

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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bostonFS - Far Sync

london - Physical standby database london2 - Logical standby database

londonFS - Far Sync (inactive) Fast-Start Failover: DISABLED Configuration Status:

SUCCESS

1. Validate that the primary and physical standby databases are ready for switchover.

(host01) DGMGRL> **validate database boston** Database Role: Primary database Ready for Switchover: ***Yes***

(host01) DGMGRL> **validate database london** Database Role: Physical standby database Primary Database: boston

Ready for Switchover: ***Yes***

Ready for Failover: Yes (Primary Running)

Current Log File Groups Configuration:

Thread # Online Redo Log Groups Standby Redo Log Groups (boston) (london)

1 3 2

Future Log File Groups Configuration:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Thread # | Online Redo  (london) | Log | Groups | Standby Redo Log Groups  (boston) |
| 1 | 3 |  |  | 2 |

1. Perform a switch over to the 'london' physical standby database. Do not exit DGMGRL.

(host01) DGMGRL> **switchover to london**

Performing switchover NOW, please wait...

Operation requires a connection to instance "london" on database "london"

Connecting to instance "london"... Connected as SYSDG.

New primary database "london" is opening...

Operation requires startup of instance "boston" on database "boston"

Starting instance "boston"...

ORACLE instance started.

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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Database mounted. Database opened.

Switchover succeeded, new primary is "london"

1. Use another terminal window logged in as oracle to host02 with the environment variables set for 'bostonFS' appropriately. Launch SQL\*Plus and connect to the PRMY.EXAMPLE.COM service.

[oracle@host02]$ **. oranev**

ORACLE\_SID = [bostonFS] ?

The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host02]$ **sqlplus system/oracle\_4U@prmy**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Dec 20 15:19:40

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Last Successful login time: Fri Dec 20 2013 14:02:22 +00:00 Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

1. Verify that you are now connected to the 'london' instance (the primary database).

(host02) SQL> **select instance\_name from v$instance;**

INSTANCE\_NAME

london

1. Verify that your connection has been established with the DEV1 pluggable database and not the root container. Exit SQL\*Plus.

(host02) SQL> **select sys\_context ('USERENV', 'CON\_NAME') as container FROM dual;**

CONTAINER DEV1

(host02) **exit**

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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1. Return to the DGMRL session running on host01 in Step 10. Validate both databases are ready for switchover, and then perform a switchover to return the configuration to the way it was at the start of this practice. Exit DGMGRL.

(host01) DGMGRL> **validate database london** Database Role: Primary database Ready for Switchover: ***Yes***

(host01) DGMGRL> **validate database boston** Database Role: Physical standby database Primary Database: london

Ready for Switchover: ***Yes***

Ready for Failover: Yes (Primary Running) Current Log File Groups Configuration:

Thread # Online Redo Log Groups Standby Redo Log Groups (london) (boston)

1 3 2

Future Log File Groups Configuration:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Thread # | Online Redo  (boston) | Log | Groups | Standby Redo Log  (london) | Groups |
| 1 | 3 |  |  | 2 |  |

(host01) DGMGRL> **switchover to boston**

Performing switchover NOW, please wait...

Operation requires a connection to instance "boston" on database "boston"

Connecting to instance "boston"... Connected as SYSDG.

New primary database "boston" is opening...

Operation requires startup of instance "london" on database "london"

Starting instance "london"... ORACLE instance started.

Database mounted. Database opened.

Switchover succeeded, new primary is "boston"

(host01) DGMGRL> **exit**

Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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Practices for Lesson 16: Enhanced Client Connectivity in a Data Guard Environment

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Practices for Lesson 17: Patching and Upgrading Databases in a Data Guard Configuration

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**Practices for Lesson 17: Patching and Upgrading Databases in a Data Guard Configuration**

**Chapter 17**

Practices for Lesson 17: Patching and Upgrading Databases in a Data Guard Configuration

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**Practices for Lesson 17: Overview**

**Practices Overview**

There are no practices for lesson 17.

Practices for Lesson 18: Optimizing a Data Guard Configuration

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**Practices for Lesson 18: Optimizing a Data Guard Configuration**

**Chapter 18**

**Practices Overview**

In these practices, you will configure network compression of redo data.

Practices for Lesson 18: Optimizing a Data Guard Configuration

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**Practices for Lesson 18: Overview**

**Practices Overview**

In these practices, you will configure network compression of redo data.

# Practice 18-1: Configuring Network Compression of Redo Data

### Overview

In this practice, you will set the RedoCompression property to configure network compression of redo data.

### Tasks

1. Use a terminal window logged in as oracle to host01 with the environment variables set for 'boston' appropriately. Launch SQL\*Plus on your primary database and determine if redo compression is enabled by querying V$ARCHIVE\_DEST.

[oracle@host01]$ **. oraenv**

ORACLE\_SID = [boston] ?

The Oracle base remains unchanged with value /u01/app/oracle

(host01) SQL> **sqlplus / as sysdba**

SQL\*Plus: Release 12.1.0.1.0 Production on Fri Dec 20 15:19:40

2013

Copyright (c) 1982, 2013, Oracle. All rights reserved. Last Successful login time: Fri Dec 20 2013 14:02:22 +00:00 Connected to:

Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production

With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

(host01) SQL> **col dest\_name format a30**

(host01) SQL> **select dest\_name, compression from v$archive\_dest;**

DEST\_NAME

COMPRES

LOG\_ARCHIVE\_DEST\_1 LOG\_ARCHIVE\_DEST\_2 LOG\_ARCHIVE\_DEST\_3 LOG\_ARCHIVE\_DEST\_4 LOG\_ARCHIVE\_DEST\_5 LOG\_ARCHIVE\_DEST\_6 LOG\_ARCHIVE\_DEST\_7 LOG\_ARCHIVE\_DEST\_8 LOG\_ARCHIVE\_DEST\_9 LOG\_ARCHIVE\_DEST\_10

LOG\_ARCHIVE\_DEST\_11

DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE

DISABLE

DEST\_NAME

COMPRES

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LOG\_ARCHIVE\_DEST\_12 LOG\_ARCHIVE\_DEST\_13 LOG\_ARCHIVE\_DEST\_14 LOG\_ARCHIVE\_DEST\_15 LOG\_ARCHIVE\_DEST\_16 LOG\_ARCHIVE\_DEST\_17 LOG\_ARCHIVE\_DEST\_18 LOG\_ARCHIVE\_DEST\_19 LOG\_ARCHIVE\_DEST\_20 LOG\_ARCHIVE\_DEST\_21

LOG\_ARCHIVE\_DEST\_22

DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE

DISABLE

DEST\_NAME

COMPRES

LOG\_ARCHIVE\_DEST\_23 LOG\_ARCHIVE\_DEST\_24 LOG\_ARCHIVE\_DEST\_25 LOG\_ARCHIVE\_DEST\_26 LOG\_ARCHIVE\_DEST\_27 LOG\_ARCHIVE\_DEST\_28 LOG\_ARCHIVE\_DEST\_29 LOG\_ARCHIVE\_DEST\_30

LOG\_ARCHIVE\_DEST\_31

DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE DISABLE

DISABLE

31 rows selected.

1. Use a terminal window logged in as oracle to host02 with the environment variables set for 'bostonFS' appropriately. Launch DGMGRL and connect to the primary database.

[oracle@host02]$ **dgmgrl**

DGMGRL for Linux: Version 12.1.0.1.0 - 64bit Production Copyright (c) 2000, 2012, Oracle. All rights reserved. Welcome to DGMGRL, type "help" for information.

(host02) DGMGRL> **connect sysdg/oracle\_4U@boston**

Connected as SYSDG.

1. Enable redo compression by setting the RedoCompression property for your far sync. Exit DGMGRL.

(host02) DGMGRL> **edit far\_sync 'bostonFS' set property 'RedoCompression'='ENABLE';**

Property "RedoCompression" updated

(host02) DGMGRL> exit

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1. Return to your SQL\*Plus session and query V$ARCHIVE\_DEST again. Note that compression is set for LOG\_ARCHIVE\_DEST\_2. Exit SQL\*Plus.

(host01) SQL> **select dest\_name, compression from v$archive\_dest;**

DEST\_NAME

COMPRES

LOG\_ARCHIVE\_DEST\_1 LOG\_ARCHIVE\_DEST\_2 LOG\_ARCHIVE\_DEST\_3

…

DISABLE

***ENABLE***

DISABLE

31 rows selected.

(host01) SQL> show **parameter log\_archive\_dest\_2;**

NAME TYPE VALUE

log\_archive\_dest\_2 string

service="bostonfs",

SYNC AFFIRM delay=0

optional ***compression=enable*** max\_failure=0 max\_connections=1 reopen=300 db\_unique\_name="bostonFS" net\_timeout=30, valid\_for=(online\_logfile

,all\_roles)

(host01) SQL> **exit**

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