Oracle® Database Appliance

Disaster Recovery on Oracle Database Appliance Using Oracle Data Guard

F77930-01
February 2023

Oracle Database Appliance Disaster Recovery on Oracle Database Appliance Using Oracle Data Guard,

F77930-01

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Contents

Preface

Oracle Database Appliance is an optimized, prebuilt database system that is easy to deploy, operate, and manage. By integrating hardware and software, Oracle Database Appliance eliminates the complexities of nonintegrated, manually assembled solutions. Oracle Database Appliance reduces the installation and software deployment times from weeks or months to just a few hours while preventing configuration and setup errors that often result in suboptimal, hard-to-manage database environments.

Audience

This guide is intended for anyone who configures, maintains, or uses Oracle Database Appliance:

- System administrators
- Network administrators
- Database administrators
- Application administrators and users

This book does not include information about Oracle Database architecture, tools, management, or application development that is covered in the main body of Oracle Documentation, unless the information provided is specific to Oracle Database Appliance. Users of Oracle Database Appliance software are expected to have the same skills as users of any other Linux-based Oracle Database installations.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Documents

For more information about Oracle Database Appliance, go to http://www.oracle.com/goto/oda/docs and click the appropriate release. The following documents are published in the Oracle Database Appliance online documentation library:

- *Oracle Database Appliance Release Notes*
- *Oracle Database Appliance Licensing Information User Manual*
- *Oracle Database Appliance Security Guide*
- *Oracle Database Appliance Accessibility Guide*
- *Oracle Database Appliance X8-2 Deployment and User's Guide*
- *Oracle Database Appliance X7-2 Deployment and User's Guide*
- *Oracle Database Appliance X6-2-HA Deployment and User's Guide*
- *Oracle Database Appliance X6-2S/M/L Deployment and User's Guide*
- *Oracle Database Appliance X5-2 Deployment and User's Guide*
- Oracle Database Appliance Setup Posters and Booklets (a full-size printed copy ships with Oracle Database Appliance)
- *Oracle Database Appliance Owner's Guide*
- *Oracle Database Appliance Service Manual*
- *Oracle Database Appliance Series Safety and Compliance Guide*

For more information about using Oracle Database, go to http://docs.oracle.com/en/database/ and select the database release from the menu. See the following documents in the Oracle Database online documentation library:

- *Oracle Database Security Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database SQL Language Quick Reference*
- *Oracle Database Backup and Recovery User's Guide*
- *Oracle Database Backup and Recovery Reference*
- *Oracle Database Utilities*
- *Oracle Automatic Storage Management Administrator's Guide*

For more information about Oracle Integrated Lights Out Manager 3.2, see https://docs.oracle.com/cd/E37444_01/.

For more details about other Oracle products that are mentioned in Oracle Database Appliance documentation, see the Oracle Documentation home page at http://docs.oracle.com.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action or terms defined in the text.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.
# prompt	The pound (#) prompt indicates a command that is run as the root user.

1

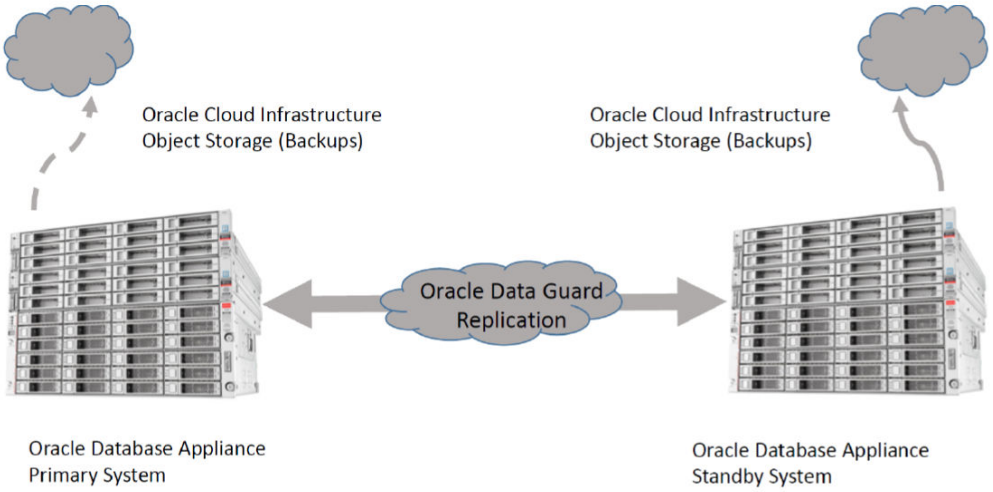
Disaster Recovery on Oracle Database Appliance Using Oracle Data Guard

This document provides a step-by-step guide to utilize Oracle Data Guard technology on Oracle Database Appliance. It provides guidelines to protect production systems while leveraging standby computing power.

Introduction to Oracle Database Appliance

Oracle Database Appliance is a pre-built, ready to deploy platform for Oracle Database.

Oracle Database Appliance systems are pre-built, pre-tuned, and ready-to-use non-clustered and clustered database systems that include servers, storage, networking, and software in an optimized configuration that makes them easy to deploy, operate, and manage. Oracle Database Appliance is a complete and ideal database platform for small, medium, and large-sized database implementations and incorporates robust, time-tested Oracle technologies, including the world-leading Oracle Database, the best-selling Oracle Real Application Clusters (Oracle RAC) database option, Oracle Clusterware, and Oracle Automatic Storage Management (Oracle ASM). By integrating hardware and software, Oracle Database Appliance eliminates the complexities inherent in non-integrated, manually assembled database solutions, reducing deployment time from weeks or months to just a few hours, while preventing configuration and setup errors that often result in sub-optimal, hard-to-manage database environments.



Data Protection Using Oracle Active Data Guard

Understand how Oracle Database Appliance can provide data protection using Oracle Active Data Guard.

The Oracle Database Appliance is a highly available system in itself. However, a standby database environment can provide data protection and reduces planned and unplanned downtime if the primary database environment becomes unavailable or corrupted. Therefore, a standby database is an integral component of Maximum Availability Architecture (MAA) to provide additional high availability and data protection for any mission-critical production system.With Oracle Maximum Availability Architecture (MAA) Gold Tier best practices, the standby database can be synchronized with the primary database, thereby minimizing database downtime for planned maintenance activities such as database upgrades and unplanned outages such as data corruptions, database failures, cluster failures, power outage, or natural disaster.

The two metrics that need to be considered to develop and implement the appropriate recovery plan are Recovery Point Objective (RPO) and Recovery Time Objective (RTO). Oracle Data Guard is the most comprehensive solution available to eliminate single points of failure for mission-critical Oracle Databases. The MAA Gold Tier prevents data loss (zero RPO) and downtime (zero RTO) in the simplest and most economical manner by maintaining a synchronized physical replica of a production database at a remote location. If the production database is unavailable for any reason, client connections can quickly, and in some configurations transparently, failover to the synchronized replica to restore service.

Oracle Active Data Guard enables administrators to improve performance by offloading processing from the primary database to a physical standby database that is open read-only while it applies updates received from the primary database. Offload capabilities of Oracle Active Data Guard include read-only reporting with the occasional write or update (through DML Re-direct in Oracle Database 19c) and ad-hoc queries (including DML to global temporary tables and unique global or session sequences), data extracts, fast incremental backups, redo transport compression, efficient servicing of multiple remote destinations, and the ability to extend zero data loss protection to a remote standby database without impacting primary database performance.

Oracle Active Data Guard also increases high availability by performing automatic block repair and enabling High Availability Upgrades (utilizing database rolling upgrade automation to bypass the need for downtime while still maintaining a highly available environment). In addition, it includes application continuity which extends data protection to in-flight transactions that may not have been committed. Oracle recommends using a separate, dedicated Oracle Database Appliance system to host the Data Guard standby system for a mission-critical production system running on the primary Oracle Database Appliance system. The MAA best practice is to have a local (synchronous replication) standby database in a nearby data center that has some level of isolation and a remote standby which is routinely maintained through asynchronous replication. This provides protection from disasters which may impact an entire region such as a large scale power outage while still maintaining a RPO of zero in the majority of unplanned outages.

Benefits of Using Oracle Data Guard and Oracle Active Data Guard

Oracle Data Guard provides numerous benefits and enables greater efficiency and efficacy for the deployed architecture.

Even though Oracle Data Guard itself does provide significant protection, MAA Gold Tier requires Oracle Active Data Guard because without Automatic Block Repair, Application Continuity and DBMS_ROLLING, the RTO/RPO included in Maximum Availability Architecture (MAA) reference architecture cannot be reached.

With the use of Oracle Active Data Guard, the standby database environment does not need to be idle or at dark capacity. Instead, the standby database can actively serve many useful purposes. These additional uses greatly increase the overall return on effort and investment.

Migration to Oracle Database Appliance - If you plan to migrate existing databases to Oracle Database Appliance, then Oracle Data Guard enables an easy approach for migration of your databases to Oracle Database Appliance. You can set up a physical standby database on your Oracle Database Appliance and switch over operations from the legacy environment to the new Oracle Database Appliance environment. This includes migration across certain platforms as well. For example, to migrate your databases currently running on the Windows platform to Oracle Database Appliance, a Linux platform, you can set up Oracle Data Guard between the two environments and perform a switch over. This approach to platform migration provides the flexibility to switchback, if for any reason you choose to do so after testing. Refer to My Oracle Support (MOS) note 413484.1: *Data Guard Support for Heterogeneous Primary and Physical Standbys in Same Data Guard Configuration*, for more information about platform migration using Oracle Data Guard.

> **Note:**
>
> Oracle Data Guard also allows you to migrate across database versions using a transient logical standby database.

Disaster Recovery - Oracle Data Guard physical standby database provides an ideal solution for disaster protection. The most common example of a disaster that occurs is a regional power outage, but disaster scenarios vary from burst water or steam pipes, fire, hurricanes, vandalism, to earthquakes, floods, and acts of terrorism. Oracle Data Guard Physical Standby Database maintains a block-for-block copy of the production database. In the event the primary environment becomes unavailable due to any reason, the standby

environment can be quickly activated to maintain continued database availability for your applications.

High Availability – Standby database and Oracle RAC can also be useful in maintaining availability during planned and unplanned outages and downtimes. Such events may include configuration changes, hardware replacements, as well as data corruption, failures resulting from human errors, and other unexpected system component or complete system failures.

Standby-First Patching – With Oracle Active Data Guard, the standby database can provide additional protection by first applying any hardware, operating system, Oracle Grid Infrastructure, and qualified database software updates. Validation can occur for hours, days, or even weeks, providing additional assurance before applying the same changes in Oracle RAC rolling manner on the primary database or by issuing an Oracle Data Guard role transition. This additional protection can prevent an outage due to bad patch or high-availability or performance regression due to the patch. The only downtime for the databases is the short period of time required to change roles between primary and standby. For more information, see My Oracle Support (MOS) note 1265700.1: *Oracle Patch Assurance - Data Guard Standby-First Patch Apply*.

Database Rolling Upgrade – With Active Data Guard and transient logical standby, you can use the standby database to minimize downtime by applying a non-rolling software change such as a major database upgrade on the standby and then subsequently switching over. Downtime is minimized to a couple of seconds due to the Data Guard switchover. For more details, refer to technical briefs: *Database Rolling Upgrade using Data Guard* and *MAA Automated Database Upgrades using Oracle Active Data Guard and DBMS_ROLLING* for Oracle databases 12.1 and later.

Auto Block Repair – One of the benefits of the physical standby database is its ability to automatically repair physical block corruptions. In a primary and standby configuration, a corrupt block can be automatically repaired, and this operation can be completely seamless to the application and database administrator. The Block Repair feature is part of the Oracle Active Data Guard option.

Application Continuity (AC) – This feature is available with the Oracle Real Application Clusters (RAC), Oracle RAC One Node and Oracle Active Data Guard options that masks outages from end users and applications by recovering the in-flight database sessions following recoverable outages. It masks outages from end users and applications by recovering the in-flight work for impacted database sessions following outages. Application Continuity performs this recovery beneath the application so that the outage appears to the application as a slightly delayed execution. Application Continuity improves the user experience for both unplanned outages and planned maintenance. It enhances the fault tolerance of systems and applications that use an Oracle database.

Offloading Workload and Activities – Despite its name, the standby environment does not have to be idle. It can be actively used to maximize the overall return on your investment. With a physical standby database in place, several key activities can be offloaded to the standby environment. These include:

- **Read-Only Workload** – Using Oracle Active Data Guard option, the standby database can be open for read-only query workload while being in the standby mode and accepting redo log updates from the primary database. In many cases, offloading read-only workloads to the standby database can dramatically reduce the production workload, thereby increasing the overall available capacity for the production system.

- **Backups** – Because the Oracle Data Guard physical standby database is a physical copy of the primary database, database backups can be completely offloaded to the standby environment and these backups can be transparently used to restore and recover the primary database in the event of a failure or database loss. Note that if Oracle Active Data Guard option is licensed, then fast incremental backups can be run at the standby database, further adding to the appeal of offloading backups to the standby database.
- **Snapshot Standby** – The Snapshot Standby database is a standby database that can be updated, and provides full data protection for the primary database. It continues to receive redo data from the primary, but the apply process is halted while the standby database is open for read/write operations for testing purposes. When testing is complete, a single command reverts the standby database to its original state, discarding the changes made while it was open in read-write mode and applying the accumulated redo logs to synchronize with the current state of primary database.

Related Topics

- Automated Database Upgrades using Oracle Active Data Guard and DBMS_ROLLING
- Oracle Database Rolling Upgrades Using a Data Guard Physical Standby Database
- Note 413484.1 - Data Guard Support for Heterogeneous Primary and Physical Standbys in Same Data Guard Configuration

Best Practices for Configuring Oracle Data Guard on Oracle Database Appliance

This section describes the best practices for setting up Oracle Data Guard on Oracle Database Appliance.

Oracle Database Appliance Bare Metal and Virtualized Platform Configurations

Oracle Database Appliance can be configured as a Bare Metal platform with KVM and DB system support or as an Oracle Virtual Machine (OVM) based Virtualized Platform. Integrated Data Guard configuration with ODACLI is the preferred way on bare metal and DB system deployments. However, the manual Oracle Data Guard physical standby setup process outlined in this technical brief can be used in both Oracle Database Appliance configurations, that is, bare metal including DB systems and OVM-based Virtualized Platform. On Oracle Database Appliance Virtualized Platform, the configuration steps are executed within the ODA_BASE domain. In addition, virtual LANs can be used on Oracle Database Appliance Virtualized Platform for configuring a logically separate network for disaster recovery purposes.

Oracle Real Application Clusters (Oracle RAC) and Oracle Data Guard are fundamental and essential components of Oracle Maximum Availability Architecture (MAA). While you can also setup Oracle Data Guard configuration between Oracle Database Appliance X6-2 S|M|L, X7-2 S|M, X8-2 S|M hardware models (the smaller, single-node configurations), such configurations do not adhere to MAA guidelines because Oracle Real Application Clusters (Oracle RAC) runs only on Oracle Database Appliance high-availability hardware models (X5-2, X6-2 HA, X7-2 HA, and X8-2 HA).

Oracle Data Guard enables you to instantly deploy an effective disaster recovery protection strategy right from the initial deployment of your Oracle Database Appliance. You can use the Oracle Data Guard Physical Standby environment for multiple purposes besides a disaster recovery solution. The physical standby configuration and setup process outlined in this technical brief is quick, simple, and it can be completed without any downtime incurred on the

primary database. Most of the standby creation steps are automated using tools such as odacli, oakcli, RMAN, and Oracle Data Guard Broker.

For a complete list of general Oracle Data Guard best practices, which also apply to the Oracle Database Appliance environment, refer to Oracle Maximum Availability Architecture and Oracle Data Guard best practices available at https://www.oracle.com/database/technologies/high-availability/oracle-database-maa-best-practices.html.

Upgrade to the latest Oracle Database Appliance release – Functionality can change with Oracle releases, such as syncing up the database related metadata. Backups and some other features might not work through Oracle Database Appliance tooling without up-to-date metadata for standby databases. With Oracle Database Appliance release 19.8 and later, Oracle Data Guard is integrated with Oracle Database Appliance. You can use ODACLI commands to quickly set up and manage Oracle Data Guard with another Oracle Database Appliance.

Match the primary and standby database configuration – To maintain consistent service levels and to use the primary and standby databases transparently, it is important to match the resources, setup, and configuration of the primary and standby systems. Significant differences between the primary and standby database configuration can result in sub-optimal performance and unpredictable behavior when role transitions occur. Specifically, the following recommendations must be considered:

- **Run primary and standby database on separate Oracle Database Appliances** – It is recommended that the primary and the standby databases run on separate, dedicated Oracle Database Appliance units preferably located in a geographically distant location.
- **Run primary and standby database with the same configuration** – Three different database configurations are supported on Oracle Database Appliance; Oracle RAC database, Oracle RAC One, and Single-Instance Enterprise Edition database. The standby database should also be of the same configuration type as the primary database. Thus, if the primary database is configured as an Oracle RAC database, then the standby database should also be configured as an Oracle RAC database.
- **Keep symmetry between the primary and standby sites** – The instances on the primary and standby databases should be configured similar to each other in terms of database parameter settings including memory, CPU, networking, and storage. This helps avoid any unpredictability when the database switch roles. In addition, any operating system configuration customizations should be mirrored in the two environments.
- **Configure flashback database on both primary and standby databases** – The Flashback Database feature enables rapid role transitions and reduces the effort required to re-establish database roles after a transition. As a best practice, Flashback Database should be configured on both primary and the standby databases. If FLASHBACK is only deemed necessary by you for re-instantiation, then it would be a good practice to reduce the retention time from the default 24 hours to 2 hours. It should be noted that as of the Oracle Database 19c release, all restoration points are automatically propagated to standby databases.
- **Use dedicated network for standby traffic** – Oracle Database Appliance comes pre-built with multiple redundant network interfaces. If required, a separate network path can be configured for the standby traffic to minimize any performance impact on the user and application-related workload. Note that since Oracle Data Guard needs to transport only the changes made to the primary

database from the primary database to the standby database, it does not impose any unnecessary requirements on the network than is needed. Therefore, many deployments of Oracle Data Guard may not require a separate network path for redo log transport between primary and standby. However, some high volume applications or your organization's best practices and standards may require a separate network path for redo log transport. Oracle Database Appliance does provide additional network interfaces on each server node that can be used for this purpose. Refer to the documentation for additional details on configuring a dedicated network for disaster recovery purposes on Oracle Database Appliance.

- **Utilize Oracle Active Data Guard** – Oracle Active Data Guard allows for read-only standby of near current data since redo apply remain continuously active between primary and standby environments. This can help distribute or offload the read-only workload from the primary environment to the standby database, increasing the return on investment in the standby database. Note that with Oracle Active Data Guard, fast incremental backups can be run on the standby database. The fast incremental backups could potentially reduce backup windows from hours to minutes. Rolling upgrades can also be done using the standby database, reducing downtime to near-zero. Additionally, Active Data Guard with real time apply enables bi-directional auto-block corruption repair providing another layer of data protection for mission-critical applications.
- **Use Oracle Data Guard Broker** – Oracle Data Guard Broker's interfaces improve usability and centralize management and monitoring of an Oracle Data Guard configuration. It minimizes overall management, and it has inherent checks and balances for Oracle Data Guard configuration.
- **Setup Oracle Clusterware role-based services** – Refer to *Client Failover Best Practices for Highly Available Oracle Databases*.

See the topic *Oracle Database Appliance References* in this document for additional references.

2

Configuring Oracle Data Guard on Oracle Database Appliance

Depending on the version of the primary database, different methods can be used for setting up the Data Guard Physical Standby Database environment.

- Configuring Oracle Data Guard on Oracle Database Appliance Release 19.14 and Later
  Depending on the version of the primary database, use different methods for setting up the Oracle Data Guard physical standby database environment.
- Configuring Oracle Data Guard on Oracle Database Appliance Release 19.8 and Earlier
  Use Oracle RMAN to configure Oracle Data Guard on Oracle Database Appliance release 19.8 and earlier.

Configuring Oracle Data Guard on Oracle Database Appliance Release 19.14 and Later

Depending on the version of the primary database, use different methods for setting up the Oracle Data Guard physical standby database environment.

Guidelines for configuring Oracle Data Guard on Oracle Database Appliance release 19.14 and later:

- Oracle recommends running the primary and the standby databases on separate Oracle Database Appliance hardware, so ensure that you have at least two separate Oracle Database Appliance systems.
- Oracle recommends that the primary and standby systems have the same Oracle Database Appliance configuration, if possible. The databases must have a similar configuration for database shape, version, memory, networking, and storage (both must have either Oracle ASM or Oracle ACFS storage) to avoid unpredictability with the database switch roles.
- The primary and standby systems must be the same Oracle Database Appliance release, and must be on Oracle Database Appliance release 19.8 or later. Although the supported minimum release is Oracle Database Appliance release 19.14 due to critical bug fixes, it is strongly recommended that you upgrade your deployment to the latest Oracle Database Appliance release.
- If you have customized the operating system, then ensure that environments on both machines are identical.
- Ensure that your deployment follows Oracle Maximum Availability Architecture (MAA) best practices. See the *Oracle Maximum Availability Architecture (MAA)* page on Oracle Technology Network.
- If you decide to use Oracle ObjectStore for backup and recovery, then you must configure access for both the primary and standby systems.

This technical brief provides guidance for configuring Oracle Data Guard on bare metal systems. With two similarly configured bare-metal Oracle Database Appliance systems acting as primary and standby, and both running Oracle Database Appliance 19.14 or later, the recommended way to configure Oracle Data Guard is to use the built-in Oracle Database Appliance commands to manage the entire lifecycle of an Oracle Data Guard configuration in an easy and efficient way, including database upgrade and patching. Check the requirements for Integrated Oracle Data Guard with Oracle Database Appliance 19.14 for any limitation that may apply.
Oracle Database Appliance documentation library is available at:

https://docs.oracle.com/en/engineered-systems/oracle-database-appliance/index.html

Configuring Oracle Data Guard on Oracle Database Appliance Release 19.8 and Earlier

Use Oracle RMAN to configure Oracle Data Guard on Oracle Database Appliance release 19.8 and earlier.

Use the **RMAN restore from service** method if the database version is 12.1.0.2 or later. Refer to My Oracle Support Note 2283978.1 for details on how to instantiate the standby database using the **restore… from service** method. The RMAN **restore… from service** clause enables online restore and recover of primary database files to a standby database over a network. This method also allows for utilizing the SECTION SIZE clause for parallelization of the restore over multiple RMAN channels.
This document provides an example step-by-step procedure for creating a primary-standby configuration for Oracle 19c and 12c databases using Oracle Database Appliance.
When you set up your primary and standby database environments in an Oracle Data Guard configuration, adhere to the following guidelines that are specific to the Oracle Database Appliance platform.

- Oracle Enterprise Manager is not integrated with Oracle Database Appliance for instantiating a standby system. You can follow the examples provided in this document for configuring your Oracle Database Appliance 12c, 18c, or 19c environments.
- On the DCS stack, create the storage structure for your standby database with the `odacli create-dbstorage` command. For example:
  Oracle Database storage on Oracle ASM:

  ```
  # odacli create-dbstorage -n boston -u chicago
  ```

  Oracle Database storage on Oracle ACFS:

  ```
  # odacli create-dbstorage -n boston -u chicago -r ACFS
  ```

3

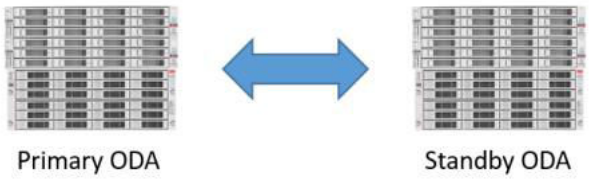
Scenario: Configure Oracle Data Guard using ODACLI Commands

This scenario describes setting up Oracle Data Guard on Oracle Database Appliance using ODACLI commands.

- Environment
  Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.
- Configuring Oracle Data Guard
  Understand the steps to configure Oracle Data Guard.
- Performing Switchover on Oracle Data Guard
  Understand the steps to switchover Oracle Data Guard.
- Failover Oracle Data Guard
  Understand the steps to failover Oracle Data Guard.
- Deconfiguring Oracle Data Guard
  Understand the steps to deconfigure Oracle Data Guard.
- Configuring Additional Network on Oracle Data Guard
  Understand how to set up additional network for Oracle Data Guard.

Environment

Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.



Component	Primary Oracle Database Appliance	Standby Oracle Database Appliance
Host Names	proddb1, proddb2	stbydb1, stbydb2
Database Name	hun	hun
Database Unique Name	buda	pest
Instance Name	budapest1, budapest2	budapest1, budapest2
SCAN Name and IPs	proddb-scan (10.1.27.2, 10.1.27.3)	stbydb-scan (10.1.27.4, 10.1.27.5)
Grid Infrastructure Software Installation	/u01/app/19.14.0.0/grid	/u01/app/19.14.0.0/grid

Component	Primary Oracle Database Appliance	Standby Oracle Database Appliance
Oracle Database Software Installation	/u01/app/odaorahome/oracle/product/19.0.0.0/db_home1	/u01/app/odaorahome/oracle/product/19.0.0.0/db_home1
Database storage	ASM	ASM
ARCHIVELOG mode	Yes	Yes
FORCE LOGGING mode	Yes	Yes

Configuring Oracle Data Guard

Understand the steps to configure Oracle Data Guard.

Configure remote database backup for the source database either on NFS or on the cloud-based Oracle Object Store

> **Note:**
>
> If the NAS or external NFS server is not already configured, then follow the steps described in the *Configuring NFS Server on Oracle Database Appliance* topic in this document.

Prerequisites:

- The NFS file system must be mounted on all source and target nodes.
- For a TDE-enabled database, the database and TDE backup folders must be readable and writeable by the `oracle` operating system user.
- For a database without TDE encryption, the database must be readable and writeable by the `oracle` operating system user.
- The NFS file system must be shared with the `no_root_squash` option.
- When configuring the backup location on Oracle Object Storage, for a TDE-enabled database, create dedicated buckets for database and TDE backups. For database without TDE encryption, create a bucket for the database backups.

Follow these steps:

1. Create a backup configuration.
   If you use NFS file system as the backup location, then run the following command:
   - For a TDE-enabled database:

     ```
     # odacli create-backupconfig -d NFS -n nfs -cr -c /odabackup/db -
     f /odabackup/tde -w 7
     ```

   - For a non-TDE database with an RMAN backup password:

     ```
     # odacli create-backupconfig -d NFS -n nfs -cr -c /odabackup/db -
     w 7
     ```

If you use Oracle Object Storage as your backup location, then perform the following steps:

a. Update the DCS agent configuration with the internet proxy, if required.

```
[root@proddb1] # odacli update-agentconfig-parameters -n
HttpProxyHost -v proxy.oracle.com -n HttpProxyPort -v 80 -u
```

b. Create Object Storage credential details.

```
[root@proddb1] # odacli create-objectstoreswift -e https://
swiftobjectstorage.us-phoenix-1.oraclecloud.com/v1 -n oosswift -t
mytenant -u firstname.lastname@oracle.com
```

c. Create a backup configuration.

```
[root@proddb1] # odacli create-backupconfig -d ObjectStore -c
dbbackups -on oosswift -w 7 -f tdebackups -cr -n
backupConfig2ObjectStorage
```

2. Verify that the backup configuration is available. For example:

```
[root@proddb1] # odacli list-backupconfigs
ID Name RecoveryWindow CrosscheckEnabled BackupDestination
------------------------------------------------------------------------
------------------------------------------------------------
------------------ --------------------
c0bc22a2-b9c0-4b3e-a4fb-1e69c661cfbf backupConfig2ObjectStorage 7 true
ObjectStore
251aadf9-34ea-4579-aab7-d0e0c8f27dc7 nfs 7 true NFS
```

3. Assign the backup configuration to the source database.
For a TDE-enabled database:

```
[root@proddb1] # odacli modify-database -in hun -bin nfs
```

For a non-TDE database with an RMAN backup password:

```
[root@proddb1] # odacli modify-database -in hun -bin nfs -bp
```

Create a Level 0 database backup and keep archive logs

1. Create a backup configuration:

```
[root@proddb1] # odacli create-backup -in hun -bt Regular-L0 -ka
{ "jobId" : "2ff6931c-aa69-4529-92fa-379dda6e6a36",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "March 18, 2022 16:15:57 PM CET",
"resourceList" : [ ],
"description" : "Create Regular-L0 Backup[TAG:auto][Db:hun][NFS:/
```

```
odabackup/db/orabackups/primaryODA-c/database/2894792645/buda]",
"updatedTime" : "March 18, 2022 16:15:57 PM CET" }
```

2. Verify that the job completed successfully:

```
[root@proddb1] # odacli describe-job -i 2ff6931c-
aa69-4529-92fa-379dda6e6a36
Job details
----------------------------------------------------------------
ID: 2ff6931c-aa69-4529-92fa-379dda6e6a36
Description: Create Regular-L0 Backup[TAG:auto][Db:hun][NFS:/
odabackup/db/orabackups/primaryODA-c/database/2894792645/buda]
Status: Success
Created: March 18, 2022 4:15:57 PM CET
Task Name                          Start
Time                                  End Time
Status
----------------------------------------------------------------
---------------------------------------- ----------
Validate TDE Wallet Existence            March 18, 2022 4:16:00 PM
CET     March 18, 2022 4:16:01 PM CET Success
Validate backup config                   March 18, 2022 4:16:01 PM
CET     March 18, 2022 4:16:01 PM CET Success
NFS location existence validation        March 18, 2022 4:16:01 PM
CET     March 18, 2022 4:16:02 PM CET Success
Backup Validations                       March 18, 2022 4:16:02 PM
CET     March 18, 2022 4:16:07 PM CET Success
Recovery Window validation               March 18, 2022 4:16:07 PM
CET     March 18, 2022 4:16:10 PM CET Success
Archivelog deletion policy configuration March 18, 2022 4:16:10 PM
CET     March 18, 2022 4:16:14 PM CET Success
Database backup                          March 18, 2022 4:16:14 PM
CET     March 18, 2022 4:17:41 PM CET Success
Password Protected TDE Wallet Backup     March 18, 2022 4:17:41 PM
CET     March 18, 2022 4:17:42 PM CET Success
```

3. Identify the ID of the backupreport that belongs to the L0 backup.

```
[root@proddb1]# odacli list-backupreports
Backup Report Id Database Resource Id Database DbId DB Name DB
Unique Name Backup Type Backup Tag Create Time Updated Time Status
----------------------------------------
---------------------------------------- ------------ ----------
-------------- ------------ ------------
----------------------------
13faba84-d83f-499d-ae4a-4bb451f4702c c0409b01-03da-4326-
b268-29a48d8d617f 2894792645 hun buda Regular-L0 auto March 18,
2022 4:16:14 PM CET March 18, 2022 4:17:42 PM CET Configured
```

4. Take a backup of the backup report in JSON format and copy it to the standby system backup on NFS:

```
[root@proddb1]# odacli describe-backupreport -i 13faba84-d83f-499d-
ae4a-4bb451f4702c > /odabackup/backupreport_hun_20220318.json
```

Backup on Oracle Object Storage:

```
[root@proddb1]# odacli describe-backupreport -i 13faba84-d83f-499d-
ae4a-4bb451f4702c > /tmp/backupreport_hun_20220318.json
```

Copy the JSON file to the standby systm:

```
[root@proddb1]# scp /tmp/backupreport_hun_20220318.json root@stbydb1:/tmp
```

5. Verify that the Object Storage Swift or NFS was configured on the standby side. For NFS, verify with the command `df -h` that the file system is mounted on both target nodes. For Oracle Object Storage, verify with the command `odacli list-objectstoreswifts` that Swift credentials are configured.
6. Restore the database as a standby on the target. The target could be a bare metal or DB system. If the target is a DB system, then ensure that no database is configured on the DB system.
   Identify the ID of the home for an existing home:

```
[root@stdbydb1 ~]# odacli list-dbhomes
ID Name DB Version Home Location Status
---------------------------------------- --------------------
---------------------------------------- ------------------------------
e8a36f29-7fcf-49fc-8575-c599dc28949d OraDB19000_home1
19.14.0.0.220118 /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1
CONFIGURED
```

   Restore the database with the `odacli irestore-database` command.

   Backup on NFS using an existing database home:

```
[root@stdbydb1 ~]# odacli irestore-database -r /odabackup/
backupreport_hun_20220318.json -u pest -ro STANDBY -t -dh
e8a36f29-7fcf-49fc-8575-c599dc28949d --backupLocation /odabackup/db
```

   Backup on Oracle Object Storage creating a new database home:

```
[root@stdbydb1 ~]# odacli irestore-database -r
backupreport_hun_20220318.json -u pest -on odabackups -ro STANDBY -t
```

   Replace `-t` with `-bp` in the above commands for a non-TDE database. For example:

```
[root@stdbydb1 ~]# odacli irestore-database -r /odabackup/
backupreport_hun_20220318.json -u pest -ro STANDBY -t -dh
e8a36f29-7fcf-49fc-8575-c599dc28949d --backupLocation /odabackup/db
Enter SYS user password:
Retype SYS user password:
Enter TDE wallet password:
{
"jobId" : "6d36ebdf-2b31-4d19-a75f-5d997286ed9f",
"status" : "Created",
"message" : null,
"reports" : [ ],
```

```
"createTimestamp" : "March 18, 2022 16:32:16",
"resourceList" : [ ],
"description" : "Database service recovery with db name: hun",
"updatedTime" : "March 18, 2022 16:32:16"
}
```

7. Verify that the job completed successfully.

```
[root@stbydb1]# odacli describe-job -i "0a35a4af-13bc-4a03-bfe6-
ec4ae4e43dc6"
Job details
----------------------------------------------------------------
ID: 6d36ebdf-2b31-4d19-a75f-5d997286ed9f
Description: Database service recovery with db name: hun
Status: Success
Created: March 18, 2022 4:32:16 PM CET
Task Name Start Time End Time Status
----------------------------------------
----------------------------------
Check if cluster ware is running March 18, 2022 4:32:17 PM CET
March 18, 2022 4:32:17 PM CET Success …
Enable New Tablespace Encryption March 18, 2022 4:49:22 PM CET
March 18, 2022 4:49:23 PM CET Success
```

8. Verify that the database is in `CONFIGURED` status.

```
[root@stbydb1]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status
DbHomeID
---------------------------------------- ---------- --------
------------
9cec6f9a-5256-48c0-8386-4bda7ee6b393 hun RAC 19.14.0.0.220118 true
OLTP odb2 ASM CONFIGURED e8a36f29-7fcf-49fc-8575-c599dc28949d
```

Configure Oracle Data Guard from the first node of the primary Oracle Database Appliance system

Prerequisites:

- Listener port and port 7070 must be open to configure Oracle Data Guard between two appliances.
- Configuring Oracle Data Guard requires Oracle Database Appliance release 19.15 when either the primary or standby database, or both, are configured on a DB system.

1. Configure Oracle Data Guard:

```
[root@ proddb1]# odacli configure-dataguard
Standby site address: stbydb1
BUI username for Standby site. If Multi-user Access is disabled on
Standby site, enter 'oda-admin'; otherwise, enter the name of the
user who has irestored the Standby database (default: oda-admin):
BUI password for Standby site:
root@stbydb1's password:
Database name for Data Guard configuration:
```

```
hun Primary database SYS password:
********************************************************************************
****************
Data Guard default settings
Primary site network for Data Guard configuration:
Public-network Standby site network for Data Guard configuration:
Public-network Primary database listener port: 1521
Standby database listener port: 1521
Transport type: ASYNC
Protection mode: MAX_PERFORMANCE
Data Guard configuration name: buda_pest
Active Data Guard: disabled
Do you want to edit this Data Guard configuration? (Y/N, default:N): y
********************************************************************************
****************
Primary site network for Data Guard configuration [Public-network]
(default: Public-network):
Standby site network for Data Guard configuration [Public-network]
(default: Public-network):
Primary database listener port (default: 1521):
Standby database listener port (default: 1521):
Transport type [ASYNC, FASTSYNC, SYNC] (default: ASYNC):
Protection mode [MAX_PROTECTION, MAX_PERFORMANCE, MAX_AVAILABILITY]
(default: MAX_PERFORMANCE):
Data Guard configuration name (default: buda_pest):
Enable Active Data Guard? (Y/N, default:N): n
Standby database's SYS password will be set to Primary database's after
Data Guard configuration. Ignore warning and proceed with Data Guard
configuration? (Y/N, default:N): y
********************************************************************************
****************
Configure Data Guard buda_pest started
********************************************************************************
****************
Step 1: Validate Data Guard configuration request (Primary site)
Description: Validate DG Config Creation for db hun Job ID: 1cdcc4d9-
f869-49ed-90a7-651a0a76db03 Started March 18, 2022 17:02:17 PM CET
Validate create Data Guard configuration request Finished March 18, 2022
17:02:21 PM CET
********************************************************************************
**************** Step 2: Validate Data Guard configuration request
(Standby site) Description: Validate DG Config Creation for db hun Job
ID: c9dcb3fc-90d7-495e-860d-d3fdd421aad0 Started March 18, 2022 17:02:22
PM CET Validate create Data Guard configuration request Finished March
18, 2022 17:02:27 PM CET
********************************************************************************
**************** Step 3: Download password file from Primary database
(Primary site) Description: Download orapwd file from Primary database
Started March 18, 2022 17:02:27 PM CET Prepare orapwd file for Primary
database hun Finished March 18, 2022 17:02:32 PM CET
********************************************************************************
**************** Step 4: Upload password file to Standby database
(Standby site) Description: Upload orapwd file to Standby database
Started March 18, 2022 17:02:32 PM CET Write orapwd file to Standby
database hun Finished March 18, 2022 17:02:43 PM CET
```

```
************************************************************************
********************** Step 5: Configure Primary database (Primary
site) Description: DG Config service for db hun - ConfigurePrimary
Job ID: ed2e490d-f3e4-40b5-adee-ec5a31c6cdc6 Started March 18, 2022
17:02:44 PM CET Configure host DNS on primary env Configure Data
Guard Tns on primary env Enable Data Guard related Db parameters
for primary env Enable force logging and archivelog mode in primary
env Enable FlashBack Configure network parameters for local
listener on primary env Restart listener on primary env Create
services for primary db Finished March 18, 2022 17:05:46 PM CET
************************************************************************
********************** Step 6: Configure Standby database (Standby
site) Description: DG Config service for db hun - ConfigureStandby
Job ID: 989931fb-c7ec-4f36-9e8e-7cbe932af96c Started March 18, 2022
17:05:47 PM CET Configure Data Guard Tns on standby env Configure
host DNS on standby env Clear Data Guard related Db parameters for
standby env Enable Data Guard related Db parameters for standby env
Enable force logging and archivelog mode in standby env Populate
standby database metadata Configure network parameters for local
listener on standby env Reset Db sizing and hidden parameters for
ODA best practice Restart Listener on standby env Create services
for standby db Finished March 18, 2022 17:07:27 PM CET
************************************************************************
********************** Step 7: Configure and enable Data Guard
(Primary site) Description: DG Config service for db hun -
ConfigureDg Job ID: 0616ad61-a6fe-4e33-b9a9-f0ea1698022f Started
March 18, 2022 17:07:28 PM CET Config and enable Data Guard Post
check Data Guard configuration Finished March 18, 2022 17:08:03 PM
CET
************************************************************************
********************** Step 8: Enable Flashback (Standby site)
Description: DG Config service for db hun - EnableFlashback Job ID:
1104e7ab-de51-4477-9a03-0cc37fc0431f Started March 18, 2022
17:08:04 PM CET Enable FlashBack Finished March 18, 2022 17:11:55
PM CET
************************************************************************
**********************
Step 9: Re-enable Data Guard (Primary site)
Description: DG Config service for db hun - ReenableDg
Job ID: 6aea76eb-e51a-4517-ae85-ba6b108804a4
Started March 18, 2022 17:11:56 PM CET
Re-enable Data Guard if inconsistent properties found Post check
Data Guard configuration
Finished March 18, 2022 17:12:53 PM CET
************************************************************************
**********************
Step 10: Create Data Guard status (Primary site)
Description: DG Status operation for db hun - NewDgconfig
Job ID: df82b9d3-9a7e-4545-888f-29d678879870 Started March 18, 2022
17:12:53 PM CET
Create Data Guard status Finished March 18, 2022 17:13:00 PM CET
************************************************************************
**********************
Step 11: Create Data Guard status (Standby site)
Description: DG Status operation for db hun - NewDgconfig
```

```
Job ID: 9a70c3b8-5edb-406e-99e8-e03c44000d03 Started March 18, 2022
17:13:01 PM CET
Create Data Guard status Finished March 18, 2022 17:13:08 PM CET
********************************************************************************
****************
Configure Data Guard buda_pest completed
********************************************************************************
****************
```

In the interactive CLI configuration steps, the parameters are as follows:

- Standby site address is IP address or host name of the standby host. Provide the fully qualified domain name and hostname if the primary and the standby systems are in the same domain and DNS is configured.
- Select Oracle Data Guard protection modes to meet availability, performance, and data protection requirements. Oracle Data Guard Protection Modes are Maximum Availability, Maximum Performance, and Maximum Protection. The log transport modes are ASYNC, SYNC, and FASTSYNC.

The following table indicates the default supported pair and the FASTSYNC mode is available only in Oracle Database 12.1 or later:

Protection Mode/ Transport Type	ASYNC	FASTSYNC	SYNC
MAXPERFORMANCE	Y	Y	Y
MAXAVAILABILITY	N	Y	Y
MAXPROTECTION	N	N	Y

Performing Switchover on Oracle Data Guard

Understand the steps to switchover Oracle Data Guard.

Follow these steps on the primary:

1. Use the `odacli list-dataguardstatus` command to verify on which system the database is running as the primary. The command also provides the ID of the Data Guard configuration which is needed in switchover and failover commands.

   ```
   [root@proddb1]# odacli list-dataguardstatus
   Updated about 2 second(s) ago
   ID Name Database Name Role Protection Mode Apply Lag Transport Lag Apply
   Rate Status
   ----------------------------------------
   ----------------------------------------
   be217130-633b-4eef-a4b7-3192028b853c buda_pest hun PRIMARY
   MAX_PERFORMANCE 0 seconds 0 seconds 14.00 KByte/s CONFIGURED
   ```

2. Initiate switchover. Provide the Oracle Data Guard configuration ID and the database unique name of the primary system.

   ```
   [root@proddb1 ~]# odacli switchover-dataguard -i be217130-633b-4eef-
   a4b7-3192028b853c -u pest
   Password for target database:
   ```

```
{
"jobId" : "02ddfc45-da95-4f70-8823-bcd30ce3b738",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "March 18, 2022 17:24:11 PM CET",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - SwitchoverDg",
"updatedTime" : "March 18, 2022 17:24:11 PM CET"
}
```

3. Monitor the status of the switchover operation.

```
[root@proddb1 ~]# odacli describe-job -i "02ddfc45-da95-4f70-8823-
bcd30ce3b738"
Job details
----------------------------------------------------------------
ID: 02ddfc45-da95-4f70-8823-bcd30ce3b738
Description: Dataguard operation for buda_pest - SwitchoverDg
Status: Success
Created: March 18, 2022 5:24:11 PM CET
Message:
Task Name Start Time End Time Status
----------------------------------------
---------------------------------- ----------
Precheck switchover DataGuard March 18, 2022 5:24:12 PM CET March
18, 2022 5:24:15 PM CET Success
Switchover DataGuard March 18, 2022 5:24:15 PM CET March 18, 2022
5:25:24 PM CET Success
Postcheck switchover DataGuard March 18, 2022 5:25:24 PM CET March
18, 2022 5:26:19 PM CET Success
Check if DataGuard config is updated March 18, 2022 5:26:29 PM CET
March 18, 2022 5:26:39 PM CET Success
```

4. Verify the status of Oracle Data Guard on both nodes after the operation completes successfully. You may need to run the command a few times to verify the changes.

```
[root@proddb1 ~]# odacli describe-dataguardstatus -i
be217130-633b-4eef-a4b7-3192028b853c
Updated about 2 minute(s) ago Dataguard Status details
----------------------------------------------------------------
ID: be217130-633b-4eef-a4b7-3192028b853c
Name: buda_pest
Database Name: c0409b01-03da-4326-b268-29a48d8d617f
Role: STANDBY
Protection Mode: MAX_PERFORMANCE
Apply Lag: 0 seconds
Transport Lag: 0 seconds
Apply Rate: 1.35 MByte/s
Status: CONFIGURED
Updated Time: March 18, 2022 5:26:26 PM CET
[root@stbydb1 ~]# odacli describe-dataguardstatus -i
be217130-633b-4eef-a4b7-3192028b853c
Updated about 5 minute(s) ago
```

```
Dataguard Status details
------------------------------------------------------------
ID: be217130-633b-4eef-a4b7-3192028b853c
Name: buda_pest
Database Name: 9cec6f9a-5256-48c0-8386-4bda7ee6b393
Role: STANDBY   <------------------------// not updated yet
Protection Mode: MAX_PERFORMANCE
Apply Lag: 0 seconds
Transport Lag: 0 seconds
Apply Rate: 2.00 KByte/s
Status: CONFIGURED
Updated Time: March 18, 2022 5:23:15 PM CET
```

Running the same command the second time:

```
[root@stbydb1 ~]# odacli describe-dataguardstatus -i be217130-633b-4eef-
a4b7-3192028b853c
Updated about 34 second(s) ago
Dataguard Status details
------------------------------------------------------------
ID: be217130-633b-4eef-a4b7-3192028b853c
Name: buda_pest
Database Name: 9cec6f9a-5256-48c0-8386-4bda7ee6b393
Role: PRIMARY <---------------------//role is updated and reflects the
right status
Protection Mode: MAX_PERFORMANCE
Apply Lag: 0 seconds
Transport Lag: 0 seconds
Apply Rate: 274.00 KByte/s
Status: CONFIGURED
Updated Time: March 18, 2022 5:29:16 PM CET
```

Failover Oracle Data Guard

Understand the steps to failover Oracle Data Guard.

Follow these steps on the standby:

1. Use the `odacli list-dataguardstatus` command to verify on which system the database is running as the standby. The command also provides the ID of the Data Guard configuration which is needed in switchover and failover commands.

```
[root@proddb1]# odacli list-dataguardstatus
Updated about 2 second(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag Apply
Rate Status
----------------------------------------
----------------------------------------
633b-4eef-a4b7-3192028b853c buda_pest hun STANDBY MAX_PERFORMANCE 0
seconds 0 seconds 14.00 KByte/s CONFIGURED
```

2. Initiate failover. Provide the Oracle Data Guard configuration ID and the database unique name of the primary system.

```
[root@proddb1 ~]# odacli failover-dataguard -i be217130-633b-4eef-
a4b7-3192028b853c -u buda
Password for target database:
{
"jobId" : "3dd42271-2919-4cae-a801-1a4d635c3120",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "March 18, 2022 17:31:12 PM CET",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - FailoverDg",
"updatedTime" : "March 18, 2022 17:31:12 PM CET"
}
```

3. Monitor the status of the failover operation.

```
[root@proddb1 ~]# odacli describe-job -i "3dd42271-2919-4cae-
a801-1a4d635c3120"
Job details
----------------------------------------------------------------
ID: 3dd42271-2919-4cae-a801-1a4d635c3120
Description: Dataguard operation for buda_pest - FailoverDg
Status: Success
Created: March 18, 2022 5:31:12 PM CET
Message: Task Name Start Time End Time Status
----------------------------------------
---------------------------------- -------------------------
Precheck failover DataGuard March 18, 2022 5:31:12 PM CET March 18,
2022 5:31:13 PM CET Success
Failover DataGuard March 18, 2022 5:31:13 PM CET March 18, 2022
5:31:45 PM CET Success
Postcheck DataGuard status March 18, 2022 5:31:45 PM CET March 18,
2022 5:31:46 PM CET Success
Check if DataGuard config is updated March 18, 2022 5:31:56 PM CET
March 18, 2022 5:32:06 PM CET Success
```

4. Reinstate the former primary as standby. Provide the Oracle Data Guard configuration ID and the database unique name of the former primary system.

```
[root@proddb1 ~]# odacli reinstate-dataguard -i be217130-633b-4eef-
a4b7-3192028b853c -u pest
Password for target database:
{
"jobId" : "c53d2d6f-a128-4b16-a894-25fc6e73493e",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "March 18, 2022 17:33:24 PM CET",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - ReinstateDg",
```

```
"updatedTime" : "March 18, 2022 17:33:24 PM CET"
}
```

5. Monitor the reinstate job status.

```
[root@proddb1 ~]# odacli describe-job -i "c53d2d6f-a128-4b16-
a894-25fc6e73493e"
Job details
----------------------------------------------------------------
ID: c53d2d6f-a128-4b16-a894-25fc6e73493e
Description: Dataguard operation for buda_pest - ReinstateDg
Status: Success
Created: March 18, 2022 5:33:24 PM CET
Message: Task
Name Start Time End Time Status
----------------------------------------
---------------------------------- --------------------------
Precheck reinstate DataGuard March 18, 2022 5:33:24 PM CET March 18, 2022
5:33:25 PM CET Success
Reinstate DataGuard March 18, 2022 5:33:25 PM CET March 18, 2022 5:35:07
PM CET Success
Postcheck DataGuard status March 18, 2022 5:35:07 PM CET March 18, 2022
5:36:30 PM CET Success
Check if DataGuard config is updated March 18, 2022 5:36:40 PM CET March
18, 2022 5:36:50 PM CET Success
```

6. Verify the status of Oracle Data Guard on both nodes after the operation completes successfully. You may need to run the command a few times to verify the changes.

```
[root@stdbydb1 ~]# odacli describe-dataguardstatus -i be217130-633b-4eef-
a4b7-3192028b853c
Updated about 34 second(s) ago Dataguard Status details
----------------------------------------------------------------
ID: be217130-633b-4eef-a4b7-3192028b853c
Name: buda_pest
Database Name: 9cec6f9a-5256-48c0-8386-4bda7ee6b393
Role: PRIMARY ←-------------------------//the status is not updated yet
Protection Mode: MAX_PERFORMANCE Apply
Lag: 0 seconds
Transport Lag: 0 seconds
Apply Rate: 274.00 KByte/s
Status: CONFIGURED
Updated Time: March 18, 2022 5:29:16 PM CET
```

Running the same command the second time:

```
[root@stdbydb1 ~]# odacli describe-dataguardstatus -i be217130-633b-4eef-
a4b7-3192028b853c
Updated about 3 second(s) ago
Dataguard Status details
----------------------------------------------------------------
ID: be217130-633b-4eef-a4b7-3192028b853c
Name: buda_pest
Database Name: 9cec6f9a-5256-48c0-8386-4bda7ee6b393
```

```
Role: STANDBY   <-----------------------//updated and correct
status
Protection Mode: MAX_PERFORMANCE
Apply Lag: 0 seconds
Transport Lag: 0 seconds
Apply Rate: 386.00 KByte/s
Status: CONFIGURED
Updated Time: March 18, 2022 5:37:35 PM CET
```

Deconfiguring Oracle Data Guard

Understand the steps to deconfigure Oracle Data Guard.

Follow these steps on the primary:

1. Use the `odacli list-dataguardstatus` command to verify on which system the database is running as the standby. The command also provides the ID of the Data Guard configuration which is needed in switchover and failover commands.

```
[root@proddb1]# odacli list-dataguardstatus
Updated about 2 second(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag
Apply Rate Status
----------------------------------------
----------------------------------------
633b-4eef-a4b7-3192028b853c buda_pest hun STANDBY MAX_PERFORMANCE 0
seconds 0 seconds 14.00 KByte/s CONFIGURED
```

2. Running Data Guard deconfiguration is an interactive process.

```
[root@proddb1 ~]# odacli deconfigure-dataguard -i
be217130-633b-4eef-a4b7-3192028b853c
Standby site address: stbydb1
BUI username for Standby site. If Multi-user Access is disabled on
Standby site, enter 'oda-admin'; otherwise, enter the name of the
user who has irestored the Standby database (default: oda-admin):
BUI password for Standby site:
root@stbydb1's password:
Standby database will be deleted after Data Guard configuration is
removed. Ignore warning and proceed with Data Guard
deconfiguration? (Y/N): y
Deconfigure Dataguard Started
************************************************************************
**********************
Step 1: Deconfigure Data Guard (Primary site)
Description: Deconfigure DG service
Job ID: ce9e0871-6630-452f-bf3a-44262b0d461d
Started March 18, 2022 17:39:04 PM CET
Deconfigure Data Guard service Cleanup broker resources Finished
March 18, 2022 17:40:49 PM CET
************************************************************************
**********************
Step 2: Delete Data Guard status (Primary site)
Description: DG Status operation for db - UpdateDgconfig
```

```
Job ID: 0aa8cebf-4cb5-4444-8426-991bab48eb6e
Started March 18, 2022 17:40:49 PM CET Finished March 18, 2022 17:40:49
PM CET
********************************************************************************
****************
Step 3: Delete Data Guard status (Standby site)
Description: DG Status operation for db - UpdateDgconfig
Job ID: adcd8b6d-e514-45ee-8eb9-998e4968ef97
Started March 18, 2022 17:40:50 PM CET
Update Data Guard status
Finished March 18, 2022 17:40:51 PM CET
********************************************************************************
****************
Step 4: Delete Standby database (Standby site)
Description: Database service deletion with db name: hun with id :
9cec6f9a-5256-48c0-8386-4bda7ee6b393
Job ID: 9fd067c3-9a51-4db9-88d2-105e673143c7 Started March 18, 2022
17:40:54 PM CET
Validate db 9cec6f9a-5256-48c0-8386-4bda7ee6b393 for deletion
Database Deletion By RHP
Unregister Db From Cluster
Close Pmon Process
Database Files Deletion
TDE Wallet deletion
Finished March 18, 2022 17:43:16 PM CET
********************************************************************************
****************
Data Guard configuration is removed
```

Configuring Additional Network on Oracle Data Guard

Understand how to set up additional network for Oracle Data Guard.

According to MAA best practices, it is recommended to use a dedicated network interface for Oracle Data Guard related traffic. The `odacli configure-dataguard` command supports configuration of an additional network. By default, Oracle Database Appliance uses public network configuration, but a different network can be assigned to it easily. If the database runs on bare metal system, then a new interface must be configured with `Dataguard` type and attached to the database.

Follow these steps:

1. Create a new network on the desired interface.

```
# odacli create-network -m network_name -n interface_name -p ip0, ip1 -w
Dataguard -no-d -s subnet_mask -g gate_ip -vs
vipname0:nodenumber0:vip0,vipname1:nodenumber1:vip1 -sn scan_name -sip
scanip0,scanip1
(optional: -t VLAN -v vlan_id)
```

For example:

```
Example: # odacli create-network -m DataGuard -n bond1 -p
"0:2.2.2.2,1:2.2.2.3" -w Dataguard -no-d -s 255.255.255.0 -g
2.2.2.1 -vs "dg-vip1:0:2.2.2.4,dg-vip2:1:2.2.2.5" -sn dg-scan -sip
2.2.2.6
```

2. Attach the network to the database.

```
# odacli modify-database -in dbname -an network name
```

For example:

```
# odacli modify-database -in testdb -an DataGuard
```

Verify the network name with the `odacli list-networks` command.

If the database runs in a DB system, then you must configure a new virtual interface with `Dataguard` type and attached to the database:

1. Create a new vnetwork on the interface you want to configure on the bare metal system:

```
# odacli create-vnetwork -n vnetwork_name -t bridged|bridgedVLAN -
br bridge_name -gw gateway -if interface_name -ip
```

For example:

```
# odacli create-vnetwork -n DataGuard -t bridged -br DataGuard -gw
2.2.2.1 -if btbond5 -ip "2.2.2.7,2.2.2.8" -nm "255.255.255.0" -u
```

2. Assign the new vnetwork to the DB system as a `Dataguard` type network on the bare metal system.

```
# odacli modify-dbsystem -n dbsystem_name -avn vnetwork_name -gw
gateway -ip ip0,ip1 -nm netmask -sn scan_name -sip scanip0,scanip1 -
vips vipname0:nodenumber0:vip0,vipname1:nodenumber1:vip1 -vt
network_type
```

For example:

```
# odacli modify-dbsystem -n oda818c5 -avn DataGuard -gw "2.2.2.1" -
ip "2.2.2.11,2.2.2.12" -nm "255.255.255.0" -sn dg-scan -sip
"2.2.2.15,2.2.2.16" -vips "dg-vip1:0:2.2.2.13,dg-vip2:1:2.2.2.14" -
vt dataguard
```

3. Attach the network to the database on the DB system host:

```
# odacli modify-database -in dbname -an network_name
```

For example:

```
# odacli modify-database -in testdb -an DataGuard
```

Run the steps on both the primary and the standby systems, regardless of whether the database is on the bare metal system or in a DB system.

4. Finally, provide the network name for the Oracle Data Guard configuration in the `odacli configure-dataguard` command. At the step “Do you want to edit this Data Guard configuration?” choose ‘y’ to change the Data Guard network.
For example:

```
Do you want to edit this Data Guard configuration? (Y/N, default:N): y
…
Primary site network for Data Guard configuration [Public-network]
(default: Public-network): DataGuard
Standby site network for Data Guard configuration [Public-network]
(default: Public-network): DataGuard
```

4

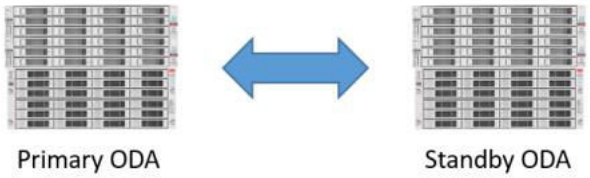
Scenario: Registering Manually Configured Oracle Data Guard with DCS

This scenario describes registering manually configured Oracle Data Guard with the DCS stack.

- Environment
  Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.
- Registering Oracle Data Guard with DCS
  Understand the steps to register Oracle Data Guard with DCS.

Environment

Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.



Component	Primary Oracle Database Appliance	Standby Oracle Database Appliance
Host Names	proddb1, proddb2	stbydb1, stbydb2
Database Name	hun	hun
Database Unique Name	buda	pest

Registering Oracle Data Guard with DCS

Understand the steps to register Oracle Data Guard with DCS.

Follow these steps:

1. Verify that the database is registered on the primary and the standby system.

```
[root@proddb1 ~]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- -------- -------- ---------- ------------
--------------------
ebefcfa2-0315-4771-9881-373294a6b626 hun RAC 19.15.0.0.220419 true OLTP
odb1 ASM CONFIGURED 14402597-639a-4e87-b655-aeae36cfa3a5
[root@stdbydb1 ~]# odacli list-databases
```

```
ID DB Name DB Type DB Version CDB Class Shape Storage Status
DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- -------- -------- ----------
------------ --------------------
ebefcfa2-0315-4771-9881-373294a6b626 hun RAC 19.15.0.0.220419 true
OLTP odb1 ASM CONFIGURED 575fca61-abbc-47ed-9530-37ad7ec5caa0
```

2. Identify the home from where the database is running on the primary.

```
[root@proddb1 ~]# odacli list-dbhomes
ID Name DB Version Home Location Status
---------------------------------------- --------------------
--------------------------------------
----------------------------------------
14402597-639a-4e87-b655-aeae36cfa3a5 OraDB19000_home1
19.15.0.0.220419 /u01/app/odaorahome/oracle/product/19.0.0.0/
dbhome_1 CONFIGURED
```

3. Verify the status of the Data Guard on the primary. Status should be healthy for the registration.

```
[oracle@proddb1 ~]$ export ORACLE_HOME=/u01/app/odaorahome/oracle/
product/19.0.0.0/dbhome_1
[oracle@proddb1 ~]$ export PATH=$ORACLE_HOME/bin:$PATH
[oracle@proddb1 ~]$ dgmgrl sys/WElcome_12##@pest
DGMGRL for Linux: Release 19.0.0.0.0 - Production on Fri May 6
13:41:52 2022
Version 19.15.0.0.0
Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights
reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "pest"
Connected as SYSDBA.
DGMGRL> show configuration
Configuration - buda_pest
Protection Mode: MaxPerformance
Members:
buda - Primary database
pest - Physical standby database
Fast-Start Failover: Disabled
Configuration Status:
SUCCESS (status updated 38 seconds ago)
DGMGRL> validate database pest
Database Role: Physical standby database
Primary Database: buda
Ready for Switchover: Yes
Ready for Failover: Yes (Primary Running)
Managed by Clusterware:
buda: YES
pest: YES
DGMGRL> exit
```

Ensure that the Oracle Data Guard configuration name is in the format *db_unique_name_of_primary_ db_unique_name_of_standby*. If multiple Oracle Data Guard configurations have the same name in `dgmgrl`, then you can only register the first Oracle Data Guard configuration with DCS. Subsequent registrations with the same name fail because each Oracle Data Guard configuration name must be unique.

```
Before renaming:
DGMGRL> show configuration
Configuration - dgconfig
Protection Mode: MaxPerformance

Members:
buda - Primary database
pest - Physical standby database
Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS (status updated 6 seconds ago)

After renaming:
DGMGRL> EDIT CONFIGURATION RENAME TO buda_pest;
Succeeded.

DGMGRL> show configuration
Configuration - buda_pest
Protection Mode: MaxPerformance
Members:
buda - Primary database
pest - Physical standby database
Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS (status updated 37 seconds ago)
```

The `odacli register-database` command expects VIPs in the tnsnames.ora and not the SCAN. The `$ORACLE_HOME/network/admin/tnsnames.ora` file must be similar to the following:

```
BUDA =
(DESCRIPTION =
(ADDRESS = (PROTOCOL = TCP)(HOST = proddb1-vip)(PORT = 1521))
(ADDRESS = (PROTOCOL = TCP)(HOST = proddb2-vip)(PORT = 1521))
(CONNECT_DATA =
(SERVER = DEDICATED)
(SERVICE_NAME = buda.domain.com)
)
)
PEST =
(DESCRIPTION =
(ADDRESS = (PROTOCOL = TCP)(HOST = stdbydb1-vip)(PORT = 1521))
(ADDRESS = (PROTOCOL = TCP)(HOST = stdbydb2-vip)(PORT = 1521))
(CONNECT_DATA =
(SERVER = DEDICATED)
(SERVICE_NAME = pest.domain.com)
```

```
)
)
```

4. Register Oracle Data Guard in DCS on the first node of the primary. If the primary runs on a DB system, then register Oracle Data Guard with the first node of the DB system.

```
[root@proddb1 ~]# odacli register-dataguard
Standby site address: stdbydb1
BUI username for Standby site (default: oda-admin):
BUI password for Standby site:
root@stdbydb1 's password:
Database name for Data Guard configuration: hun
Primary database SYS password:
********************************************************************
**********************
Data Guard default settings
Primary site network for Data Guard configuration: Public-network
Standby site network for Data Guard configuration: Public-network
Primary database listener port (TCP): 1521
Standby database listener port (TCP): 1521
Transport type: ASYNC
Protection mode: MAX_PERFORMANCE
Data Guard configuration name: buda_pest
Does the above Data Guard configuration match your actual
configuration? (Y/N, default:N):
********************************************************************
**********************
Primary site network for Data Guard configuration [Public-network]
(default: Public-network):
Standby site network for Data Guard configuration [Public-network]
(default: Public-network):
Primary database listener port (TCP) (default: 1521):
Standby database listener port (TCP) (default: 1521):
Transport type [ASYNC, FASTSYNC, SYNC] (default: ASYNC):
Protection mode [MAX_PROTECTION, MAX_PERFORMANCE, MAX_AVAILABILITY]
(default: MAX_PERFORMANCE):
Data Guard configuration name (default: buda_pest): buda_pest
********************************************************************
**********************
Register Data Guard buda_pest started
********************************************************************
**********************
Step 1: Validate register Data Guard configuration request (Primary
site)
Description: Validate DG Config Creation for db hun
Job ID: fc5436d2-67db-4d4c-927c-9053c56dc510
Started May 06, 2022 13:49:33 PM GMT
Validate if database ID exists
Validate if dg config name exists
Validate database role
Validate if database is configured with Data Guard already
Validate tnsnames.ora
Validate database connection
Validate if data guard in good status
```

```
Precheck switchover DataGuard
Validate if input matches DGMGRL output
Validate if flashback enabled
Finished May 06, 2022 13:49:40 PM GMT
********************************************************************************
****************
Step 2: Validate register Data Guard configuration request (Standby site)
Description: Validate DG Config Creation for db hun
Job ID: 54224175-eb0a-4e07-a84d-b758692dc55c
Started May 06, 2022 13:49:42 PM GMT
Validate if database ID exists
Validate if dg config name exists
Validate database role
Validate if database is configured with Data Guard already
Validate tnsnames.ora
Validate database connection
Validate if data guard in good status
Validate if input matches DGMGRL output
Validate if flashback enabled
Finished May 06, 2022 13:49:46 PM GMT
********************************************************************************
****************
Step 3: Create Data Guard status (Primary site)
Description: DG Status operation for db hun - RegisterDg
Job ID: c6dcec88-2e21-4bc0-a243-6ab61885be88
Started May 06, 2022 13:49:47 PM GMT
Create Data Guard status
Finished May 06, 2022 13:49:53 PM GMT
********************************************************************************
****************
Step 4: Create Data Guard status (Standby site)
Description: DG Status operation for db hun - RegisterDg
Job ID: 44f312ad-97b0-4eff-8d47-7134433011c5
Started May 06, 2022 13:49:54 PM GMT
Create Data Guard status
Finished May 06, 2022 13:50:01 PM GMT
********************************************************************************
****************
Register Data Guard buda_pest completed
********************************************************************************
****************
```

5. Verify the registration.

```
[root@proddb1 ~]# odacli list-dataguardstatus
Updated about 7 minute(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag Apply
Rate Status
---------------------------------------- --------------------------------
-------------------- ---------- ------------------ --------------
-------------- ---------------
cd86f70d-31d5-4798-8abf-a8148ec2e389 buda_pest hun PRIMARY
MAX_PERFORMANCE 0 seconds 0 seconds 5.00 KByte/s CONFIGURED
[root@proddb2 ~]# odacli list-dataguardstatus
Updated about 8 minute(s) ago
```

```
ID Name Database Name Role Protection Mode Apply Lag Transport Lag
Apply Rate Status
----------------------------------------
------------------------------ -------------------- ----------
------------------ --------------- ---------------- ---------------
cd86f70d-31d5-4798-8abf-a8148ec2e389 buda_pest hun PRIMARY
MAX_PERFORMANCE 0 seconds 0 seconds 5.00 KByte/s CONFIGURED
[root@stdbydb1 ~]# odacli list-dataguardstatus
Updated about 8 minute(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag
Apply Rate Status
----------------------------------------
------------------------------ -------------------- ----------
------------------ --------------- --------------- ---------------
cd86f70d-31d5-4798-8abf-a8148ec2e389 buda_pest hun STANDBY
MAX_PERFORMANCE 0 seconds 0 seconds 5.00 KByte/s CONFIGURED
[root@stdbydb2 ~]# odacli list-dataguardstatus
Updated about 8 minute(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag
Apply Rate Status
----------------------------------------
------------------------------ -------------------- ----------
------------------ --------------- --------------- ---------------
cd86f70d-31d5-4798-8abf-a8148ec2e389 buda_pest hun STANDBY
MAX_PERFORMANCE 0 seconds 0 seconds 5.00 KByte/s CONFIGURED
```

6. Verify that switchover, failover, and reinstate operations work.

```
[root@proddb1 ~]# odacli switchover-dataguard -u pest -i
cd86f70d-31d5-4798-8abf-a8148ec2e389
Password for target database:
{
"jobId" : "2821ca72-eb6e-462f-8a7b-5f976a401673",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "May 06, 2022 14:01:31 PM GMT",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - SwitchoverDg",
"updatedTime" : "May 06, 2022 14:01:31 PM GMT"
}
[root@proddb1 ~]# odacli describe-job -i "2821ca72-
eb6e-462f-8a7b-5f976a401673"
Job details
----------------------------------------------------------------
ID: 2821ca72-eb6e-462f-8a7b-5f976a401673
Description: Dataguard operation for buda_pest - SwitchoverDg
Status: Success
Created: May 6, 2022 2:01:31 PM GMT
Message:
Task Name Start Time End Time Status
----------------------------------------
----------------------------------
---------------------------------- ----------
Precheck switchover DataGuard May 6, 2022 2:01:31 PM GMT May 6,
```

```
2022 2:01:34 PM GMT Success
Switchover DataGuard May 6, 2022 2:01:34 PM GMT May 6, 2022 2:02:53 PM
GMT Success
Postcheck switchover DataGuard May 6, 2022 2:02:53 PM GMT May 6, 2022
2:02:54 PM GMT Success
Check if DataGuard config is updated May 6, 2022 2:04:14 PM GMT May 6,
2022 2:04:24 PM GMT Success
[root@stdbydb1 ~]# odacli switchover-dataguard -u buda -i
cd86f70d-31d5-4798-8abf-a8148ec2e389
Password for target database:
{
"jobId" : "7d7ef3f3-f48b-449f-a2b8-9a5de0882ff3",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "May 06, 2022 14:06:28 PM GMT",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - SwitchoverDg",
"updatedTime" : "May 06, 2022 14:06:28 PM GMT"
}
[root@stdbydb1 ~]# odacli describe-job -i "7d7ef3f3-f48b-449f-
a2b8-9a5de0882ff3"
Job details
----------------------------------------------------------------
ID: 7d7ef3f3-f48b-449f-a2b8-9a5de0882ff3
Description: Dataguard operation for buda_pest - SwitchoverDg
Status: Success
Created: May 6, 2022 2:06:28 PM GMT
Message:
Task Name Start Time End Time Status
----------------------------------------
---------------------------------- ----------------------------------
----------
Precheck switchover DataGuard May 6, 2022 2:06:28 PM GMT May 6, 2022
2:06:31 PM GMT Success
Switchover DataGuard May 6, 2022 2:06:31 PM GMT May 6, 2022 2:07:36 PM
GMT Success
Postcheck switchover DataGuard May 6, 2022 2:07:36 PM GMT May 6, 2022
2:07:37 PM GMT Success
Check if DataGuard config is updated May 6, 2022 2:08:37 PM GMT May 6,
2022 2:08:47 PM GMT Success
[root@stdbydb1 ~]# odacli list-dataguardstatus
Updated about 19 minute(s) ago
ID Name Database Name Role Protection Mode Apply Lag Transport Lag Apply
Rate Status
---------------------------------------- --------------------------------
-------------------- ---------- ------------------ ---------------
-------------- --------------- ----------
cd86f70d-31d5-4798-8abf-a8148ec2e389 buda_pest hun STANDBY
MAX_PERFORMANCE 0 seconds 0 seconds 3.29 MByte/s CONFIGURED
[root@stdbydb1 ~]# odacli failover-dataguard -u pest -i
cd86f70d-31d5-4798-8abf-a8148ec2e389
Password for target database:
{
"jobId" : "e6cd3092-94fb-4fbd-9dce-cdf9aad4638a",
```

```
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "May 06, 2022 14:20:46 PM GMT",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - FailoverDg",
"updatedTime" : "May 06, 2022 14:20:46 PM GMT"
}
[root@stdbydb1 ~]# odacli describe-job -i e6cd3092-94fb-4fbd-9dce-
cdf9aad4638a
Job details
----------------------------------------------------------------
ID: e6cd3092-94fb-4fbd-9dce-cdf9aad4638a
Description: Dataguard operation for buda_pest - FailoverDg
Status: Success
Created: May 6, 2022 2:20:46 PM GMT
Message:
Task Name Start Time End Time Status
----------------------------------------
----------------------------------
---------------------------------- ----------
Precheck failover DataGuard May 6, 2022 2:20:46 PM GMT May 6, 2022
2:20:47 PM GMT Success
Failover DataGuard May 6, 2022 2:20:47 PM GMT May 6, 2022 2:21:08
PM GMT Success
Postcheck DataGuard status May 6, 2022 2:21:08 PM GMT May 6, 2022
2:21:09 PM GMT Success
Check if DataGuard config is updated May 6, 2022 2:21:19 PM GMT May
6, 2022 2:21:29 PM GMT Success
[root@stdbydb1 ~]# odacli reinstate-dataguard -u buda -i
cd86f70d-31d5-4798-8abf-a8148ec2e389
Password for target database:
{
"jobId" : "cb82e0ea-558d-4eb6-ad7a-82c373da7504",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "May 06, 2022 14:26:50 PM GMT",
"resourceList" : [ ],
"description" : "Dataguard operation for buda_pest - ReinstateDg",
"updatedTime" : "May 06, 2022 14:26:50 PM GMT"
}
[root@stdbydb1 ~]# odacli describe-job -i "cb82e0ea-558d-4eb6-
ad7a-82c373da7504"
Job details
----------------------------------------------------------------
ID: cb82e0ea-558d-4eb6-ad7a-82c373da7504
Description: Dataguard operation for buda_pest - ReinstateDg
Status: Success
Created: May 6, 2022 2:26:50 PM GMT
Message:
Task Name Start Time End Time Status
----------------------------------------
----------------------------------
---------------------------------- ----------
```

```
Precheck reinstate DataGuard May 6, 2022 2:26:50 PM GMT May 6, 2022
2:26:51 PM GMT Success
Reinstate DataGuard May 6, 2022 2:26:51 PM GMT May 6, 2022 2:28:36 PM GMT
Success
Postcheck DataGuard status May 6, 2022 2:28:36 PM GMT May 6, 2022 2:28:37
PM GMT Success
Check if DataGuard config is updated May 6, 2022 2:28:47 PM GMT May 6,
2022 2:28:57 PM GMT
```

5

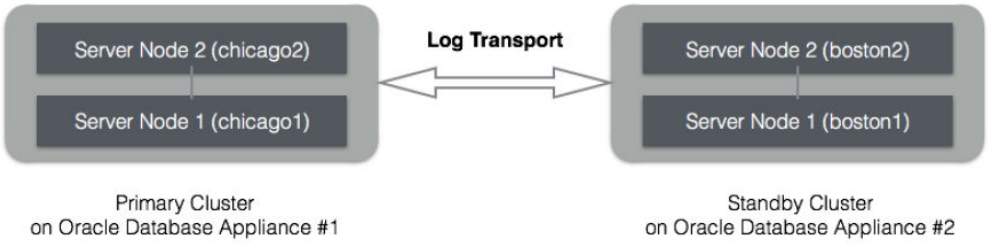
Scenario: Configure Oracle Data Guard Manually on the DCS Stack

This scenario describes setting up Oracle Data Guard on Oracle Database Appliance on the DCS stack.

- Environment
  Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.
- Configuring Oracle Data Guard
  Understand the steps to configure Oracle Data Guard manually. it is highly recommended to configure Oracle Data Guard with Oracle Data Guard Broker.

Environment

Understand the primary and standby database environment topologies used in the subsequent Data Guard setup example using Oracle Database Appliance.



Component	Primary Oracle Database Appliance	Standby Oracle Database Appliance
Appliance Name	appliance#1	appliance#2
Host Names	proddb1, proddb2	stbydb1, stbydb2
Database Name	chicago	chicago
Database Unique Name	chicago	boston
Instance Name	chicago1, chicago2	boston1, boston2
SCAN Name and IPs	proddb-scan (10.1.27.2, 10.1.27.3)	stbydb-scan (10.1.27.4, 10.1.27.5)
Grid Infrastructure Software Installation	/u01/app/19.14.0.0/grid	/u01/app/19.14.0.0/grid
Oracle Database Software Installation	/u01/app/odaorahome/oracle/product/19.0.0.0/db_home1	/u01/app/odaorahome/oracle/product/19.0.0.0/db_home1
Database storage	ASM	ASM
ARCHIVELOG mode	Yes	Yes
FORCE LOGGING mode	Yes	Yes

Configuring Oracle Data Guard

Understand the steps to configure Oracle Data Guard manually. it is highly recommended to configure Oracle Data Guard with Oracle Data Guard Broker.

Follow these steps:

1. Create Standby Redo Logs.
   Standby Redo Logs (SRLs) receives redo data from the primary database in real time minimizing transport and apply lag. In advance of the primary standby setup, Oracle recommends that standby redo logs be created on the primary database as well so that it is immediately ready to receive redo data following a Data Guard role transition. Create Standby Redo Logs (SRL) on the primary database. Each thread of the standby redo log must have at least one more redo log group than the corresponding thread of the online redo log. For example:

   ```
   SQL> alter database add standby logfile thread 1 group 7 size 1G,
   group 8 size 1G, group 9 size 1G, group 10 size 1G;
   SQL> alter database add standby logfile thread 2 group 11 size
   1G,group 12 size 1G, group 13 size 1G, group 14 size 1G;
   ```

   To check the number of online redo logs and their sizes, use the following query:

   ```
   SQL> select thread#, group#, bytes/1024/1024/1024 SIZE_IN_GB,
   status from v$log;
   ```

   Note that the size of the standby redo logs must match the size of the redo logs. On the Oracle Database Appliance platform, the standby redo logs must be created on the REDO disk group which resides on the solid state disks. On Oracle Database Appliance Small/Medium/Large and on X8-2 HA models the control file and online logs are stored in RECO diskgroup as there is no REDO disk group. To validate the size of each log file and number of log groups in the standby redo log, use the following query:

   ```
    SQL> select group#, thread#, bytes/1024/1024/1024 SIZE_IN_GB from
   v$standby_log;
   ```

2. Enable archivelog mode on primary database.

> **Information:**
>
> Archiving is the process of saving and protecting redo information in the form of archive files before the redo logs of an active database are overwritten in a circular manner. Databases created on Oracle Database Appliance have archiving turned on by default. It is not mandatory to run your databases in archive log mode which is the default setting on Oracle Database Appliance.

Verify that the primary database is running in ARCHIVELOG mode.

```
SQL> archive log list
```

If the primary database is not running in ARCHIVELOG mode, then enable ARCHIVELOG mode as follows:

a. Shut down both instances on Oracle Database Appliance.

```
$ srvctl stop database -d chicago
```

b. Start and mount one instance in exclusive mode.

```
SQL> startup mount exclusive;
```

c. Turn on archiving.

```
SQL> alter database archivelog;
```

d. Shut down the instance.

```
SQL> shutdown immediate;
```

e. Restart the database.

```
$ srvctl start database -d chicago
```

3. Enable FORCE LOGGING mode.
Force logging enables you to capture database operations performed with the NOLOGGING attribute. This ensures integrity of your standby database. Verify if FORCE LOGGING has already been enabled on your primary database.

```
SQL> select force_logging from v$database;
```

If FORCE LOGGING is not enabled, then enable it using the following commands:

```
SQL> alter database force logging;
```

4. Configure Flashback Database feature.
The Oracle Flashback Database feature provides a fast alternative to performing incomplete database recovery. Although using the Flashback Database feature is optional, it can be very useful for faster reinstating of the old primary database after a failover. Thus, if you do a failover to the standby and the old primary can be repaired, you do not have to rebuild the old primary database as a standby database but simply flashback and let Oracle Data Guard resynchronize from that point onwards. Check if the primary database has Flashback Database enabled, and if required, enable it.

```
SQL> select flashback_on from v$database; SQL> alter database flashback
on;
```

Note that enabling Flashback Database requires additional space consumption in the Fast Recovery Area, that is, RECO disk group. The space used by flashback logs can be

controlled by setting the parameter `DB_FLASHBACK_RETENTION_TARGET` to a desired value. This value is specified in minutes. For example:

```
SQL> alter system set DB_FLASHBACK_RETENTION_TARGET=120 scope=both
sid='*';
```

5. Enable standby file management.
When the primary database adds or drops a datafile, the corresponding action must also be automatically taken on the standby database. This operation can be enabled using automated standby file management.

```
SQL> alter system set STANDBY_FILE_MANAGEMENT=AUTO scope=both
sid='*';
```

6. Create the database home on the standby if it does not exist. For example:

```
[root@stbydb1]# odacli create-dbhome -v 19.14.0.0.220118
```

The database home version on the standby must be identical to database home version on the primary.

7. Setup TNS entries and listeners.
Oracle Net Service Names must be configured to enable redo transportation across the databases. Update `tnsnames.ora` file to include the TNS alias for both primary and standby databases. Note that in the Oracle Database Appliance, the `tnsnames.ora` file is located in the `network/admin` directory of the Oracle database home.

```
$ vi $ORACLE_HOME/network/admin/tnsnames.ora
Primary
chicago =
(DESCRIPTION =
 (ADDRESS = (PROTOCOL = TCP)(HOST = proddb-scan)(PORT = 1521))
 (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
chicago.oracle.com)
  )
 )

boston =
(DESCRIPTION =
 (ADDRESS = (PROTOCOL = TCP)(HOST = stbydb-scan)(PORT = 1521))
 (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
boston.oracle.com)
  )
 )
Standby
chicago =
(DESCRIPTION =
 (ADDRESS = (PROTOCOL = TCP)(HOST = proddb-scan)(PORT = 1521))
 (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
chicago.oracle.com)
  )
 )
boston =
```

```
(DESCRIPTION =
 (ADDRESS = (PROTOCOL = TCP)(HOST = stbydb-scan)(PORT = 1521))
(CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = boston.oracle.com)
 ) )
```

8. Setup Redo Transport Service in deferred mode. This step is not needed if Oracle Data Guard Broker is configured.
   The Oracle Data Guard redo transport mechanism uses Oracle Net connections to send the redo between the databases. Redo transport is enabled by setting the `LOG_ARCHIVE_DEST_n` parameter. For example, the following setup enables log shipping and uses LGWR based transmission in asynchronous mode.

   ```
   SQL> alter system set log_archive_dest_2='SERVICE=boston LGWR ASYNC
   REGISTER VALID_FOR=(online_logfile,primary_role)
   REOPEN=60 DB_UNIQUE_NAME=boston' scope=both sid='*';
   SQL> alter system set log_archive_dest_state_2='defer' scope=both sid='*';
   ```

   For more information about redo log transmission options, see the *Oracle Data Guard Concepts and Administration Guide*.

9. Setup Fetch Archive Log Server. This step is not needed if Oracle Data Guard Broker is configured.
   When the database is in standby role and the primary is unable to send any missing log files, then the standby database can use the FAL_SERVER setting to pull those missing log files. The FAL_SERVER parameter is uses the Oracle Net service name.

   ```
   SQL> alter system set FAL_SERVER=boston scope=both sid='*';
   ```

10. Create a `pfile` from the `spfile` on the primary database.

    ```
    [oracle@proddb1]$ export ORACLE_HOME=u01/app/odaorahome/oracle/product/
    19.0.0.0/dbhome_1
    [oracle@proddb1]$ export ORACLE_SID=chicago1
    [oracle@proddb1]$ export PATH=$ORACLE_HOME/bin:$PATH
    [oracle@proddb1]$ sqlplus / as sysdba
    SQL> create pfile='/tmp/chicago.pfile' from spfile;
    ```

11. Add or modify the parameters on the primary and standby.
    Primary:

    ```
    *.cluster_database=TRUE
    chicago2.instance_number=2
    chicago1.instance_number=1
    chicago2.thread=2
    chicago1.thread=1
    chicago2.undo_tablespace='UNDOTBS2'
    chicago1.undo_tablespace='UNDOTBS1'
    *.db_block_checking=FULL
    *.db_block_checksum=FULL
    *.db_lost_write_protect=TYPICAL …….
    *.db_unique_name=chicago
    *.listener_networks='((NAME=net1)
    (LOCAL_LISTENER=(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=primary node0
    vip)(PORT=1521)))))','((NAME=net1)
    ```

```
(LOCAL_LISTENER=(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=primary
node1 vip) (PORT=1521))))',''(NAME=net1)(REMOTE_LISTENER=primary
scan name:1521))'
*.LOG_FILE_NAME_CONVERT='+REDO/BOSTON/','+REDO/CHICAGO/'
*.DB_FILE_NAME_CONVERT='+DATA/BOSTON/','+DATA/CHICAGO/'
*.log_archive_dest_1='LOCATION=USE_DB_RECOVERY_FILE_DEST
VALID_FOR=(ALL_LOGFILES,ALL_ROLES) MAX_FAILURE=1 REOPEN=5
DB_UNIQUE_NAME=chicago ALTERNATE=log_archive_dest_10'
*.log_archive_dest_10='LOCATION=+DATA/db19c/arc10
VALID_FOR=(ALL_LOGFILES,ALL_ROLES) DB_UNIQUE_NAME=chicago
ALTERNATE=log_archive_dest_1'

Add the following parameters:
*.audit_file_dest='/u01/app/oracle/admin/chicago/adump'
*.fal_server='boston' *.remote_login_passwordfile='exclusive'
```

Standby:

```
*.cluster_database=TRUE
boston2.instance_number=2
boston1.instance_number=1
boston2.thread=2 boston1.thread=1
boston2.undo_tablespace='UNDOTBS2'
boston1.undo_tablespace='UNDOTBS1'
*.db_block_checking=FULL
*.db_block_checksum=FULL
*.db_lost_write_protect=TYPICAL …….
*.db_unique_name=boston
*.listener_networks='(NAME=net1)
(LOCAL_LISTENER=(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=standby
node0 vip) (PORT=1521))))',''(NAME=net1)
(LOCAL_LISTENER=( DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=standby
node1 vip)(PORT=1521) ))))',''(NAME=net1)(REMOTE_LISTENER=standby
scan name:1521))'
*.LOG_FILE_NAME_CONVERT='+REDO/CHICAGO/','+REDO/BOSTON/'
*.DB_FILE_NAME_CONVERT='+DATA/CHICAGO/','+DATA/BOSTON/'
*.log_archive_dest_1='LOCATION=USE_DB_RECOVERY_FILE_DEST
VALID_FOR=(ALL_LOGFILES,ALL_ROLES) MAX_FAILURE=1 REOPEN=5
DB_UNIQUE_NAME=boston ALTERNATE=log_archive_dest_10'
*.log_archive_dest_10='LOCATION=+DATA/db19c/arc10
VALID_FOR=(ALL_LOGFILES,ALL_ROLES) DB_UNIQUE_NAME=boston
ALTERNATE=log_archive_dest_1'

Add the following parameters:
*.audit_file_dest='/u01/app/oracle/admin/boston/adump'
*.fal_server='chicago'
*.remote_login_passwordfile='exclusive'
```

Set data protection parameters. Refer to *My Oracle Support Note 1302539.1 - Best Practices for Corruption Detection, Prevention, and Automatic Repair - in a Data Guard Configuration On ODA Small/Medium/Large* On Oracle Database Appliance X8-2-HA models, the controlfile and online logs are stored in the RECO disk group as there is no REDO disk group. Databases use listener_networks

instead of local_listener and remote_listener parameters starting from Oracle Database Appliance release 19.6 on bare metal systems.

12. Create storage structures for the database on the standby.

```
[root@stbydb1]$ # odacli create-dbstorage -n chicago -u boston
{
"jobId" : "054dac68-9efe-4f0d-a027-5515d46ada8a",
"status" : "Created",
"message" : null,
"reports" : [ ],
"createTimestamp" : "October 18, 2021 14:14:11 PM CEST",
"resourceList" : [ ],
"description" : "Database storage service creation with db name:
chicago",
"updatedTime" : "October 18, 2021 14:14:11 PM CEST"
}
[root@stbydb1]# odacli describe-job -i "054dac68-9efe-4f0d-
a027-5515d46ada8a"
Job details
----------------------------------------------------------------
ID: 054dac68-9efe-4f0d-a027-5515d46ada8a
Description: Database storage service creation with db name: chicago
Status: Success
```

13. Copy the password file from the primary database to the first standby system.

```
[oracle@proddb1]$ srvctl config database -d chicago |grep Password
Password file: +DATA/CHICAGO/PASSWORD/pwdchicago.386.1086365117
[grid@proddb1 ~]$ asmcmd ASMCMD> pwcopy +DATA/CHICAGO/PASSWORD/
pwdchicago.386.1086365117 /tmp/pwdboston copying +DATA/CHICAGO/PASSWORD/
pwdchicago.386.1086365117 -> /tmp/pwdboston
[grid@proddb1]$ scp /tmp/pwdboston oracle@stbydb1:/u01/app/odaorahome/
oracle/product/19.0.0.0/dbhome_1/dbs/orapwboston
```

14. Copy the modified pfile to the first standby host and mount the standby database. Make a note of the path where the standby control file is created.

```
[oracle@proddb1]$ scp /tmp/chicago.pfile oracle@stbydb1.oracle.com:/tmp/
boston.pfile
[oracle@stbydb1]$ export ORACLE_HOME=/u01/app/odaorahome/oracle/product/
19.0.0.0/dbhome_1
[oracle@stbydb1]$ export ORACLE_SID=boston1
[oracle@stbydb1]$ export PATH=$ORACLE_HOME/bin:$PATH
[oracle@stbydb1]$ cp /u01/app/odaorahome/oracle/product/19.0.0.0/
dbhome_1/dbs/orapwboston /u01/app/odaorahome/oracle/product/19.0.0.0/
dbhome_1/dbs/orapwboston1
[oracle@stbydb1]$ rman target / RMAN> startup nomount pfile='/tmp/
boston.pfile';
RMAN> restore standby controlfile from service chicago;
Starting restore at 19-OCT-21
using target database control file
instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=483 instance=boston1 device type=DISK
```

```
channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: using network backup set from service chicago
channel ORA_DISK_1: restoring control file
channel ORA_DISK_1: restore complete, elapsed time: 00:00:02 output
file name=+FLASH/BOSTON/CONTROLFILE/current.256.1086380745
Finished restore at 19-OCT-21
```

15. Update the Control File parameter Edit the pfile `/tmp/chicago.pfile` and replace the `control_files` parameter to show the new path from the previous output. For example:

```
control_files= '+FLASH/DB19CSTBY/CONTROLFILE/current.256.1086380745'
[oracle@stbydb1]$ vi /tmp/boston.pfile
```

16. Start the standby instance in **nomount** mode using the modified pfile. Create the spfile and restart the instance with the spfile.

```
[oracle@stbydb1$ export ORACLE_HOME=/u01/app/odaorahome/oracle/
product/19.0.0.0/dbhome_1 [oracle@stbydb1$ export
ORACLE_SID=boston1
[oracle@stbydb1$ export PATH=$ORACLE_HOME/bin:$PATH
[oracle@stbydb1]$ sqlplus / as sysdba
SQL> create spfile='+DATA/BOSTON/PARAMETERFILE/spfileboston' from
pfile='/tmp/boston.pfile';
SQL> !echo "spfile='+DATA/BOSTON/PARAMETERFILE/spfileboston'"
> /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1/dbs/
initboston1.ora
SQL> !echo "spfile='+DATA/BOSTON/PARAMETERFILE/spfileboston'"
> /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1/dbs/
initboston2.ora
SQL> startup mount force;
```

17. Enable parallelism and set `SECTION SIZE=64MB`. To use parallelism during the restore, determine the number of CPUs on your server by running the following:

```
[oracle@stbydb1]$ grep -c ^processor /proc/cpuinfo 20
```

Make the following RMAN configuration changes on the standby database. The following example uses 8 preconfigured channels for RMAN to use during the recovery process.

```
[oracle@stbydb1]$ rman target /
RMAN> CONFIGURE DEFAULT DEVICE TYPE TO DISK;
RMAN> CONFIGURE DEVICE TYPE DISK PARALLELISM 8;
```

18. Restore the Standby Database from the primary database service Backing up a single large file in parallel, The multi section backup and restore capability in RMAN improves backup and recovery rates. RMAN divides the work among multiple channels and each channel acts upon a file section in a file. If you specify a small section size that would produce more than 256 sections, then RMAN increases the section size to a value that results in exactly 256 sections. The

Section size clause depends on various factor such as network bandwidth, number of channels, sizes of data files, and application datafile sizes.

```
oracle@stbydb1]$ sqlplus system/welcome1@chicago
SQL> select TABLESPACE_NAME, bytes/1024/1024/1024 SIZE_IN_GB from
dba_data_files;
TABLESPACE_NAME SIZE_IN_GB
------------------------------ ----------
UNDOTBS1 .102539063
SYSTEM .947265625
SYSAUX .91796875
UNDOTBS2 .024414063
USERS .004882813
```

For example, when you run the following command on the standby system, you specify a backup section size of 64MB.

```
[oracle@stbydb1]$ rman target /
RMAN> restore database from service chicago section size 64M;
RMAM> recover database from service chicago;
RMAN> backup spfile;
```

19. Enable log shipping on the primary. Run this step only if you have not configured Oracle Data Guard Broker.

```
[oracle@proddb1]$ sqlplus / as sysdba
SQL> alter system set log_archive_dest_state_2='enable' scope=both;
```

20. Enable Flashback Database on the standby and adjust retention as required. Run this step only if you have not configured Oracle Data Guard Broker.

```
SQL> alter database flashback on;
SQL> alter system set DB_FLASHBACK_RETENTION_TARGET=120;
```

21. Start managed recovery on the standby. Run this step only if you have not configured Oracle Data Guard Broker.

```
[oracle@stbydb1]$ sqlplus / as sysdba
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT FROM
SESSION;
```

22. Register the standby database with Oracle Clusterware.

```
[oracle@stbydb1]$ export ORACLE_HOME=/u01/app/odaorahome/oracle/product/
19.0.0.0/dbhome_1
[oracle@stbydb1]$ export ORACLE_SID=boston1
[oracle@stbydb1]$ export PATH=$ORACLE_HOME/bin:$PATH

Example with single-instance Oracle Database:
[oracle@stbydb1]$ srvctl add database -db boston -oraclehome /u01/app/
odaorahome/oracle/product/19.0.0.0/dbhome_1 -dbtype SINGLE -instance
boston1 -node stbydb1 -dbname chicago -diskgroup 'DATA,RECO,FLASH' -role
physical_standby -spfile '+DATA/BOSTON/PARAMETERFILE/spfileboston' -
startoption mount -acfspath '/u01/app/odaorahome,/u01/app/
```

```
odaorabase0,/u01/app/odaorabase1'

Example with Oracle RAC Database:
[oracle@stbydb1]$ srvctl add database -db boston -
oraclehome /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1 -
dbtype RAC -dbname chicago -diskgroup 'DATA,RECO,FLASH' -role
physical_standby -spfile '+DATA/BOSTON/PARAMETERFILE/spfileboston' -
startoption mount -acfspath '/u01/app/odaorahome,/u01/app/
odaorabase0,/u01/app/odaorabase1'
[oracle@stbydb1]$ srvctl add instance -db boston -instance boston1 -
node stbydb1
[oracle@stbydb1]$ srvctl add instance -db boston -instance boston2 -
node stbydb2
```

23. Copy the password file to Oracle ASM and verify that the password file points to Oracle ASM.

```
[grid@stbydb1 ~]$ asmcmd ASMCMD> pwcopy /u01/app/odaorahome/oracle/
product/19.0.0.0/dbhome_1/dbs/orapwboston +DATA/DB19CSTBY/
PASSWORDFILE/pwdboston --dbuniquename boston
copying /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1/dbs/
orapwboston -> +DATA/DB19CSTBY/PASSWORDFILE/pwdboston
[oracle@stbydb1]$ export ORACLE_HOME=/u01/app/odaorahome/oracle/
product/19.0.0.0/dbhome_1
[oracle@stbydb1]$ export ORACLE_SID=boston1
[oracle@stbydb1]$ export PATH=$ORACLE_HOME/bin:$PATH
[oracle@stbydb1]$ srvctl config database -db boston|grep Password
```

24. Set the parameters and create the Oracle Data Guard Broker configuration.
Note: Flashback database is required to re-instantiate a failed primary after a failover role transition. Optionally enable flashback on both primary and standby. The standby database can begin using flashback with the PostCR script as follows:

```
[oracle@stbydb1]$ sqlplus / as sysdba
connect / as sysdba
alter system set dg_broker_config_file1='+DATA/BOSTON/dr1.dat'
scope=both;
alter system set dg_broker_config_file2='+DATA/BOSTON/dr2.dat'
scope=both;
alter system set db_flashback_retention_target=120 scope=spfile;
alter database flashback on;
alter system set dg_broker_start=true;
[oracle@stbydb1]$ srvctl stop database -db boston
[oracle@stbydb1]$ srvctl start database -db boston -startoption
mount
[oracle@stbydb1]$ sqlplus sys/welcome1@chicago as sysdba
alter system set dg_broker_config_file1='+DATA/CHICAGO/dr1.dat'
scope=both;
alter system set dg_broker_config_file2='+DATA/CHICAGO/dr2.dat'
scope=both;
alter system set dg_broker_start=TRUE;
Wait 1 min
[oracle@stbydb1]$ dgmgrl sys/welcome1@chicago
CREATE CONFIGURATION dgconfig AS PRIMARY DATABASE IS CHICAGO
```

```
CONNECT IDENTIFIER IS CHICAGO;
ADD DATABASE BOSTON AS CONNECT IDENTIFIER IS BOSTON ;
ENABLE CONFIGURATION
```

If `ALTER DATABASE FLASHBACK ON` failed with `ORA-38788`, let the standby sync up and run the following steps to enable flashback after that:

```
[oracle@stbydb1]$ sqlplus / as sysdba
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;
SQL> alter database flashback on;
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

25. Verify using SQL*Plus and SRVCTL.

```
[oracle@stbydb1]$ srvctl config database -d chicago
[oracle@stbydb1]$ srvctl config database -d boston
[oracle@stbydb1]$ sqlplus / as sysdba
SQL> select FORCE_LOGGING, FLASHBACK_ON, OPEN_MODE, DATABASE_ROLE,
SWITCHOVER_STATUS, DATAGUARD_BROKER, PROTECTION_MODE from v$database;
SQL> select PROCESS,PID,DELAY_MINS from V$MANAGED_STANDBY;
```

26. Verify Oracle Data Guard using DGMGRL.

```
$ dgmgrl DGMGRL> connect sys/welcome1@boston
DGMGRL> show configuration verbose
DGMGRL> show database verbose chicago
DGMGRL> show database verbose boston
DGMGRL> validate database chicago
DGMGRL> validate database boston
```

27. Setup Oracle Clusterware Role Based Services. Refer to *Client Failover Best Practices for Highly Available Oracle Databases*.
28. Register the databases:

```
[oracle@stbydb1]$ dgmgrl sys/welcome1@boston as sysdba
DGMGRL> edit database 'boston' set state='apply-off'; Succeeded.
DGMGRL> sql 'ALTER DATABASE OPEN READ ONLY'; Succeeded.
[oracle@stbydb1]# odacli list-databases DCS-10032:Resource database is
not found.
[oracle@stbydb1]# odacli register-database -c OLTP -s odb2 -sn
boston.oracle.com -nn Public-network -t RAC Job details
------------------------------------------------------------------
ID: 841f99e0-a66f-4b23-b753-b04f992a6c33 Description: Discover
Components : db [oracle@stbydb1]# odacli describe-job -i 841f99e0-
a66f-4b23-b753-b04f992a6c33
Job details
------------------------------------------------------------------
ID: 9947df75-e9f4-4a42-bcd7-ec23561a2f3f
Description: Database service registration with db service name: test.com
Status: Success
Created: February 18, 2022 12:52:04 PM CET
Message: Task Name Start Time End Time Status
--------------------------------------
```

```
---------------------------------
--------------------------------- ---------- Validate Hugepages
For Register DB February 18, 2022 12:52:05 PM CET February 18, 2022
12:52:05 PM CET Success Enable OMF parameters February 18, 2022
12:52:06 PM CET February 18, 2022 12:52:07 PM CET Success Setting
db character set February 18, 2022 12:52:07 PM CET February 18,
2022 12:52:07 PM CET Success Move Spfile to right location February
18, 2022 12:52:07 PM CET February 18, 2022 12:52:15 PM CET Success
Enable DbSizing Template February 18, 2022 12:52:15 PM CET February
18, 2022 12:53:26 PM CET Success Running DataPatch February 18,
2022 12:53:26 PM CET February 18, 2022 12:53:28 PM CET Success
Reset Associated Networks for Databse February 18, 2022 12:53:29 PM
CET February 18, 2022 12:53:33 PM CET Success Reset Associated
Networks February 18, 2022 12:53:33 PM CET February 18, 2022
12:53:33 PM CET Success
[oracle@stbydb1]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status
DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- -------- -------- ----------
------------ ----------------------------------------
9139ea53-449d-413a-841b-b157c084f3e0 bikazug RAC 19.14.0.0.220118
false OLTP odb2 ASM CONFIGURED 2afd69ed-f2cd-4345-9860-480f9e21f3ad
[oracle@stbydb1]# odacli describe-database -i fbc4a32e-fec4-403d-
b7b8-b08a3c01ab46
Database details
----------------------------------------------------------------
ID: 9139ea53-449d-413a-841b-b157c084f3e0
Description: chicago
DB Name: chicago
DB Version: 19.14.0.0.220118
DB Type: RAC
DB Role: STANDBY DB
Target Node Name:
DB Edition: EE
DBID: 1128302500 Instance Only
Database: false
CDB: false
PDB Name:
PDB Admin User Name:
SEHA Enabled: false
Class: OLTP
Shape: odb2
Storage: ASM
DB Redundancy: MIRROR
CharacterSet: AL32UTF8
National CharacterSet: AL16UTF16
Language: AMERICAN
Territory: AMERICA
Home ID: 2afd69ed-f2cd-4345-9860-480f9e21f3ad
Console Enabled: false
TDE Wallet Management:
TDE Enabled: false
Level 0 Backup Day:
AutoBackup Enabled: true
```

```
Created: February 18, 2022 12:52:02 PM CET
DB Domain Name:
Associated Networks: Public-network
CPU Pool Name:
```

29. Enable log shipping again and restart the standby database.

```
[oracle@stbydb1]$ dgmgrl sys/welcome1@boston as sysdba
DGMGRL> edit database 'boston' set state='apply-on';
Succeeded.
[oracle@stbydb1]$ srvctl stop database -db boston
[oracle@stbydb1]$ srvctl start database -db boston
```

30. Verify switchover operation with Oracle Data Guard:

```
$ dgmgrl DGMGRL> connect sys/welcome1@boston
DGMGRL> switchover to boston
DGMGRL> connect sys/welcome1@chicago
DGMGRL> switchover to chicago;
```

31. Verify failover operation with Oracle Data Guard.
Connect to standby before failover:

```
$ dgmgrl DGMGRL> connect sys/welcome1@boston
DGMGRL> failover to boston
DGMGRL> reinstate database chicago
```

Connect to former primary before failover:

```
DGMGRL> connect sys/welcome1@chicago
DGMGRL> failover to chicago;
DGMGRL> reinstate database boston
```

6

Scenario: Upgrading Database with Manually Configured Oracle Data Guard

This scenario describes upgrading a database with manually configured Oracle Data Guard on Oracle Database Appliance on the DCS stack.

> **Note:**
>
> The following section does not apply for Oracle Data Guard set up with ODACLI commands. Use ODACLI commands to upgrade the databases.

- Upgrading All Components
  Upgrading an Oracle Database Appliance environment consists of upgrading DCS, server, storage, and database components.
- Upgrading Oracle Database Release 19.12 and Earlier
  The purpose of this section is to provide a high-level overview of the upgrade process in a primary-standby setup.
- Patching Oracle Database Release 19.12 and Earlier
  Patching databases on Oracle Database Appliance is an online operation. The following steps describe how to patch databases on a standby configuration. These stteps apply to databases on bare metal and databases on DB systems.
- Configuring NFS Server on Oracle Database Appliance
  If either NAS or Oracle Object Storage is not an option, then configure NFS on one of the Oracle Database Appliance to take a backup of the source database and to restore it as a standby on the target system.
- Oracle Database Appliance References
  Links and references to the concepts, commands, and examples used in this document.

Upgrading All Components

Upgrading an Oracle Database Appliance environment consists of upgrading DCS, server, storage, and database components.

When upgrading an Oracle Database Appliance environment where a standby system is already implemented, you can use the standby system to reduce the downtime required for completing the upgrade activities. The purpose of this section is to provide a high-level overview of the upgrade process in a primary-standby setup.

1. Verify that the system is operating correctly by running pre-checks, validating hardware and system processes, and verifying system configuration using ORAChk.
2. Take a backup of the operating system, Oracle Grid Infrastructure, Oracle homes, and databases in the primary environment. Refer to *My Oracle Support Note 2466177.1 - ODA (Oracle Database Appliance): ODABR a System Backup/Restore Utility*.

3. Upgrade DCS and server components on the standby Oracle Database Appliance system.
4. Switchover the primary database role and application connections to the standby system.
5. Upgrade DCS and server components on the current standby, that is, the former primary system.
6. For deployments with Oracle Database Appliance release earlier than 19.12, patch or upgrade the database. On bare metal deployments with Oracle Database Appliance release 19.12 and later, refer to the *Oracle Database Appliance Deployment and User's Guide* for the steps to patch the databases using ODACLI commands. ODACLI provides complete lifecycle management for Oracle Data Guard environments including database patching and upgrade if your Oracle Data Guard deployment was configured using ODACLI commands.

With this upgrade process, the downtime during the upgrade is minimized and system availability is affected only for the duration of upgrade or patching of the database component.

Upgrading Oracle Database Release 19.12 and Earlier

The purpose of this section is to provide a high-level overview of the upgrade process in a primary-standby setup.

Upgrading DCS, server, operating system, Oracle Grid Infrastructure, and general firmware, storage with switchover and switchback can help reduce downtime during upgrade. If you are only upgrading the database component, then unless you are using a zero downtime solution such as active-active Oracle GoldenGate solution, some downtime is expected for the application. Following is the process for database upgrade when a standby configuration exists:

1. Verify that the system is operating correctly by running pre-checks, validating hardware and system processes, and verifying system configuration using ORAChk.
2. Take a backup of the database and Oracle homes.
3. Stop the standby database.

```
[oracle@stbydb1]$ srvctl stop database -d boston
```

4. Create a new database home or use an existing one on the standby with the version that you want to upgrade the database to on the primary.

```
[oracle@stbydb1]# odacli create-dbhome -v 19.14.0.0.220118
```

5. Stop log shipping on the primary.

```
[oracle@ proddb1] dgmgrl connect sys/welcome1@chicago
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'ON'
DGMGRL> edit database 'boston' SET PROPERTY 'LogShipping'='OFF';
Property "LogShipping" updated
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'OFF'
```

6. Create a new database home or use an existing database home on the primary with the version that you want to upgrade the database.

```
# odacli create-dbhome -v 19.14.0.0.220118
```

7. Stop the application.
8. Upgrade the primary database using the `odacli upgrade database` command.

```
[root@proddb1]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status DbHomeID
---------------------------------------- ---------- --------
----------------------------------
e97cc2f3-bdd8-4775-b959-d5f79a6c59fc chicago Rac 18.11.0.0.200714 false
Oltp Odb1 Asm Configured
88ce2c7-fa3d-4f93-802a-bfa50d180758
[root@proddb1]# odacli list-dbhomes
ID Name DB Version Home Location Status
---------------------------------------- --------------------
----------------------------------------
---------------------------------------------- ----------
863c8cbe-1c5f-450e-866c-15c384580ad3 OraDB19000_home1
19.14.0.0.220118 /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1
Configured
288ce2c7-fa3d-4f93-802a-bfa50d180758 OraDB18000_home1
18.11.0.0.200714 /u01/app/oracle/product/18.0.0.0/dbhome_1 Configured
[root@proddb1]# odacli upgrade-database -i
713b68d3-8c43-4d10-973e-90a3fa88a84a -destDbHomeId
863c8cbe-1c5f-450e-866c-15c384580ad3 -sourceDbHomeId 288ce2c7-
fa3d-4f93-802a-bfa50d180758
[root@proddb1]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- -------- -------- ---------- ------------
----------------------------------
713b68d3-8c43-4d10-973e-90a3fa88a84a chicago Rac 19.14.0.0.220118 false
Oltp Odb1 Asm Configured
863c8cbe-1c5f-450e-866c-15c384580ad3
```

9. Start the application.
10. Copy the `tnsnames.ora` file on the standby from the old Oracle home to the new on all nodes.
11. Copy the password file from the primary to the standby.

```
[oracle@proddb1]$ srvctl config database -d chicago |grep Password
Password file: +DATA/CHICAGO/PASSWORD/pwdchicago.277.1023633847
[grid@proddb1 ~]$ asmcmd ASMCMD> pwcopy +DATA/CHICAGO/PASSWORD/
pwdchicago.277.1023633847 /tmp/pwdboston copying +DATA/CHICAGO/PASSWORD/
pwdchicago.277.1023633847 -> /tmp/pwdboston
[oracle@proddb1]$ scp /tmp/pwdboston oracle@stbydb1: /u01/app/odaorahome/
oracle/product/19.0.0.0/dbhome_1/dbs/orapwboston
[grid@stbydb1 ~]$ asmcmd ASMCMD> pwcopy /u01/app/odaorahome/oracle/
product/19.0.0.0/dbhome_1/dbs/orapwboston +DATA/BOSTON/PASSWORDFILE/
```

```
pwdboston copying /u01/app/odaorahome/oracle/product/19.0.0.0/
dbhome_1/dbs/orapwboston -> +DATA/BOSTON/PASSWORDFILE/pwdboston
```

12. Remove the Oracle Database 18c database from Oracle Clusterware on the standby.

```
[oracle@ stbydb1]# srvctl remove database -db boston
Remove the database boston? (y/[n]) y
```

13. Add the database back to the Clusterware on the standby. The Oracle home must point to the new version of the home.

```
Example with single-instance Oracle Database:
[oracle@stbydb1]$ srvctl add database -db boston -
oraclehome /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1 -
dbtype SINGLE -instance boston1 -node stbydb1 -dbname chicago -
diskgroup 'DATA,REDO,RECO' -role physical_standby -spfile '+DATA/
BOSTON/PARAMETERFILE/spfileboston' -pwfile '+DATA/BOSTON/
PASSWORDFILE/pwdboston' -startoption mount

Example with Oracle RAC Database:
[oracle@stbydb1]$ srvctl add database -db boston -
oraclehome /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1 -
dbtype RAC -dbname chicago -diskgroup 'DATA,RECO,REDO' -role
physical_standby -spfile '+DATA/BOSTON/PARAMETERFILE/spfileboston' -
pwfile '+DATA/BOSTON/PASSWORDFILE/pwdboston' -startoption mount
[oracle@stbydb1]$ srvctl add instance -database boston -instance
boston1 -node stbydb1
[oracle@stbydb1]$ srvctl add instance -database boston -instance
boston2 -node stbydb2
[oracle@stbydb1]$ srvctl start instance -db boston -instance
boston1 -o mount
[oracle@stbydb1]$ srvctl start instance -db boston -instance
boston2 -o mount
```

14. Enable log shipping and validate Oracle Data Guard configuration.

```
[oracle@stbydb1]$ dgmgrl
DGMGRL> connect sys/welcome1@chicago
DGMGRL> edit database 'boston' SET PROPERTY 'LogShipping'='ON';
Property "LogShipping" updated
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'ON'
DGMGRL> show configuration verbose
DGMGRL> show database verbose chicago
DGMGRL> show database verbose boston
DGMGRL> validate database chicago DGMGRL> validate database boston
```

15. Verify switchover and failover operations.
Switchover tests are as follows:

```
$ dgmgrl DGMGRL> connect sys/welcome1@boston
DGMGRL> switchover to boston
DGMGRL> connect sys/welcome1@chicago
DGMGRL> switchover to chicago;
```

Failover tests are as follows:

```
//Connect to standby before failover:
$ dgmgrl
DGMGRL> connect sys/welcome1@boston DGMGRL> failover to boston
DGMGRL> reinstate database chicago

//Connect to former primary before failover:
DGMGRL> connect sys/welcome1@chicago DGMGRL> failover to chicago;
DGMGRL> reinstate database boston

//Health check:
DGMGRL> show database verbose chicago
DGMGRL> show database verbose boston
DGMGRL> validate database chicago
DGMGRL> validate database boston
```

16. Sync up the registry on the standby system:

```
[root@ stbydb1~]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status DbHomeID
---------------------------------------- ---------- --------
------------------- ---------- ---
e6450a56-5a7d-4dab-9ca9-25b004b66646 chicago Rac 18.11.0.0.200714 false
Oltp Odb1 Asm Configured
755b4b5d-6211-4d94-81e8-cf611868fe39
Sync up registry entries
[root@ stbydb1~]# odacli update-registry -n db -f
[root@ stbydb1~]# odacli describe-job -i 25ec2987-4c93-4d25-97db-
bad2f6f602f6
Job details
----------------------------------------------------------------
ID: 25ec2987-4c93-4d25-97db-bad2f6f602f6
Description: Discover
Components : db
Status: Success
Created: November 6, 2021 11:00:50 PM CET
Message:
Task Name Start Time End Time Status
----------------------------------------
---------------------------------- --------------------
Rediscover DBHome November 6, 2019 11:00:54 PM CET November 6, 2019
11:00:56 PM CET Success
Rediscover DB: boston November 6, 2019 11:00:56 PM CET November 6, 2019
11:01:02 PM CET Success
Confirm the changes in the registry
[root@ stbydb1~]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status bHomeID
---------------------------------------- ---------- --------
------------------- ----
e6450a56-5a7d-4dab-9ca9-25b004b66646 chicago Rac 19.14.0.0.220118 false
Oltp Odb1 Asm Configured
17f68bbf-b812-42e5-96ba-1433c30f75ed
```

The total downtime requirement the duration of the database upgrade. A switchover and switchback is not required for a database upgrade. Note that the update registry operation removes backup, dbdomain, CPU pools and associated network settings for all databases. Backup, CPU pools and associated network settings can be added again with the `odacli modify-database` command.

Patching Oracle Database Release 19.12 and Earlier

Patching databases on Oracle Database Appliance is an online operation. The following steps describe how to patch databases on a standby configuration. These stteps apply to databases on bare metal and databases on DB systems.

Note that if the database uses, Oracle JVM, then you cannot patch the standby system first. Refer to *My Oracle Support Note 2217053.1 - RAC Rolling Install Process for the "Oracle JavaVM Component Database PSU/RU"* to confirm OJVM usage. In such a case, defer log shipping on the primary system and patch the primary system first.

Follow these steps:

1. Verify that the system is operating correctly by running pre-checks, validating hardware and system processes, and verifying system configuration using ORAChk.
2. Take a backup of the database.
3. Stop log shipping on the primary.

```
$ dgmgrl DGMGRL> connect sys/welcome1@chicago
DGMGRL> edit database 'CHICAGO' SET STATE="LOG-TRANSPORT-OFF";
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'ON'
DGMGRL> edit database 'boston' SET PROPERTY 'LogShipping'='OFF';
Property "LogShipping" updated
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'OFF'
```

4. Stop the standby database and restart it in `read only` mode.

```
[oracle@stbydb1]$ srvctl stop database -d boston
[oracle@stbydb1]$ srvctl start database -db boston -o "read only"
```

5. Patch the standby database first. Identify the Oracle home of the database.

```
[root@ocboda10 ~]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status
DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- ----------------------------------
667a0eec-910c-404b-9820-aedcddf668d7 chicago Rac 19.11.0.0.210420
false Oltp Odb1 Asm Configured
863c8cbe-1c5f-450e-866c-15c384580ad3
[oracle@stbydb1]# odacli list-dbhomes
ID Name DB Version Home Location Status
---------------------------------------- --------------------
----------------------------------------
--------------------------------
863c8cbe-1c5f-450e-866c-15c384580ad3 OraDB19000_home1
```

```
19.11.0.0.210420 /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1
Configured
```

Run pre-checks on the Oracle home.

```
[oracle@stbydb1]# odacli update-dbhome -p -i 6d05e3f1-e948-4482-bcba-
c560d9c8e5e5 -v 19.14.0.0
[oracle@stbydb1]# odacli describe-job -i b4ee24d9-2b82-4c80-b789-
ced90013e4b3
Job details
----------------------------------------------------------------
ID: b4ee24d9-2b82-4c80-b789-ced90013e4b3
Description: DB Home
Prechecks Status: Success
Created: November 7, 2021 6:26:51 PM CET
```

Apply the patches.

```
[oracle@stbydb1]# odacli update-dbhome -i 6d05e3f1-e948-4482-bcba-
c560d9c8e5e5 -v 19.14.0.0
[oracle@stbydb1]# odacli describe-job -i
"e3556125-7ce6-4560-9f22-3fdd9738f955"
Job details
----------------------------------------------------------------
ID: e3556125-7ce6-4560-9f22-3fdd9738f955
Description: DB Home Patching: Home Id is e4e9fcbd-63d4-4c56-bb0c-
b239a4e749f3
Status: Success
Created: November 7, 2021 7:09:52 PM CET
```

Verify the results.

```
[oracle@stbydb1]# odacli list-dbhomes
ID Name DB Version Home Location Status
---------------------------------------- --------------------
----------------------------------------
e4e9fcbd-63d4-4c56-bb0c-b239a4e749f3 OraDB19000_home2
19.14.0.0.220118 /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_2
Configured
863c8cbe-1c5f-450e-866c-15c384580ad3 OraDB19000_home1
19.11.0.0.210420 /u01/app/odaorahome/oracle/product/19.0.0.0/dbhome_1
Configured
[oracle@stbydb1]# odacli list-databases
ID DB Name DB Type DB Version CDB Class Shape Storage Status DbHomeID
---------------------------------------- ---------- --------
-------------------- ---------- -------- -------- ---------- ------------
667a0eec-910c-404b-9820-aedcddf668d7 chicago Rac 19.14.0.0.220118 false
Oltp Odb1 Asm Configured
e4e9fcbd-63d4-4c56-bb0c-b239a4e749f3
```

6. Patch the primary database, similar to the steps for patching the standby database.

7. Start log shipping on the primary and verify Oracle Data Guard configuration.

```
DGMGRL> connect sys/welcome1@chicago
DGMGRL> edit database 'boston' SET PROPERTY 'LogShipping'='ON';
Property "LogShipping" updated
DGMGRL> SHOW DATABASE 'boston' 'LogShipping'; LogShipping = 'ON'
DGMGRL> show configuration verbose
DGMGRL> show database verbose chicago
DGMGRL> show database verbose boston
DGMGRL> validate database chicago
DGMGRL> validate database boston
```

Configuring NFS Server on Oracle Database Appliance

If either NAS or Oracle Object Storage is not an option, then configure NFS on one of the Oracle Database Appliance to take a backup of the source database and to restore it as a standby on the target system.

NFS server must be configured on the bare system location of the primary and the standby, for both Oracle Data Guard on bare metal system or DB system.

Follow these steps:

1. Create an ADVM volume on source bare metal system `node0` as the `grid` operating system user.

```
[grid@odabm1 ~]$ asmcmd
asmcmd> volcreate -G data -s 100G backup
ASMCMD> volinfo -G data backup
Diskgroup Name: DATA
Volume Name: BACKUP
Volume Device: /dev/asm/backup-322
State: ENABLED
Size (MB): 102400
Resize Unit (MB): 64
Redundancy: HIGH
Stripe Columns: 8
Stripe Width (K): 4096
Usage: Mountpath:
```

2. Format the volume as Oracle ACFS.

```
[grid@odabm1 ~]$ mkfs -t acfs /dev/asm/backup-322
mkfs.acfs: version = 19.0.0.0.0
mkfs.acfs: on-disk version = 46.0
mkfs.acfs: volume = /dev/asm/backup-322
mkfs.acfs: volume size = 107374182400 ( 100.00 GB )
mkfs.acfs: Format complete.
```

3. Create a mount point on both nodes. Run the command on both nodes on the bare metal system:

```
# mkdir /backup
```

4. Register the file system with Oracle Clusterware and start it as `root` operating system user.

```
[root@odabm1 ~]# /u01/app/19.15.0.0/grid/bin/srvctl add filesystem -
d /dev/asm/backup-322 -path /backup -mountowner oracle -mountgroup dba
[root@odabm1 ~]# /u01/app/19.15.0.0/grid/bin/srvctl start filesystem -
d /dev/asm/backup-322
```

5. Append to `/etc/exports` on `node0` on the bare metal system and make it active.

```
[root@odabm1 ~]# vi /etc/exports
/backup *(rw,sync,no_root_squash)

//or add each source and target nodes separately:
/backup primary1(rw,sync,no_root_squash)
/backup primary2(rw,sync,no_root_squash)
/backup standby1(rw,sync,no_root_squash)
/backup standby2(rw,sync,no_root_squash)

//where primary1, primary2 nodes refer to the nodes hosting the primary
database and standby1,
//standby2 refer to the nodes hosting the standby
[root@odabm1 ~]# exportfs -a
[root@odabm1 ~]# exportfs -v
...
/backup
*(sync,wdelay,hide,no_subtree_check,sec=sys,rw,secure,no_root_squash,no_al
l_squash)
```

6. Create a mount point on the source and the target nodes using the same mount point name.

```
# mkdir /odabackup
```

7. Mount the file system on both nodes using the public IP address of `node0` on the source bare metal system.

```
# mount -t nfs 192.168.17.2:/backup /odabackup
```

8. As the `oracle` user ID may be different between the source and target, create a subfolder under `/odabkp` and change the ownership to `oracle:dba` on it.

```
# mkdir /odabackup/db
In case the DB is TDE enabled then one more folder is required:
# mkdir /odabackup/tde # chown -R oracle:dba /odabackup
```

9. After configuring NFS on both source and target, follow the Oracle Data Guard configuration process till the step to restore the database as a standby.
10. Before restoring the database, change the ownership to `oracle:dba` on the target. The user and group IDs may be different between the source and target.

```
# chown -R oracle:dba /odabackup
```

11. Complete the Oracle Data Guard configuration.
12. After configuring Oracle Data Guard, revert all NFS-related changes.
    a. Unmount `/odabkp` on source and target nodes.

    ```
    # unmount /odabkp
    ```

    b. Unmount `/backup` on all bare metal system nodes.

    ```
    # unmount /backup
    ```

    c. Remove `/backup` from `/etc/exports`.
    d. Update the NFS configuration on the first bare metal system node.

    ```
    [root@odabm1 ~]# exportfs -a
    ```

    e. Delete the backup Oracle ACFS file system from the Oracle Clusterware configuration.

    ```
    [root@odabm1 ~]# /u01/app/19.15.0.0/grid/bin/srvctl stop
    filesystem -d /dev/asm/backup-322
    [root@odabm1 ~]# /u01/app/19.15.0.0/grid/bin/srvctl remove
    filesystem -d /dev/asm/backup-322
    ```

    f. Delete the backup related Oracle ADVM volume as the `grid` operating system user on the bare metal system node.

    ```
    [grid@odabm1 ~]$ asmcmd
    ASMCDM> voldelete -G data backup
    ```

    g. Reassign the original backup configuration to the primary database. By default, the value is `default`.

    ```
    [root@proddb1 ~]# odacli modify-database -in databasename -bin
    default
    ```

Oracle Database Appliance References

Links and references to the concepts, commands, and examples used in this document.

Documentation Links

- Oracle Database Appliance Documentation Library
- Configuring Oracle Data Guard on Oracle Database Appliance
- Oracle Database High Availability Website
- Oracle Real Application Clusters Website
- Oracle Clusterware Website
- Oracle Data Guard Website

- Oracle Data Guard Concepts and Administration

Technical Briefs

- Oracle Maximum Availability Architecture (MAA)
- Best Practices for Configuring Redo Transport for Data Guard and Active Data Guard 12c
- Best Practices for Asynchronous Redo Transport - Data Guard and Active Data Guard
- Best Practices for Synchronous Redo Transport - Data Guard and Active Data Guard
- Best Practices for Automatic Resolution of Outages to Resume Data Guard Zero Data Loss
- Preventing, Detecting, and Repairing Block Corruption - Oracle Database 12c
- Role Transition Best Practices: Data Guard and Active Data Guard
- Client Failover Best Practices for Highly Available Oracle Databases
- Oracle Database Rolling Upgrade using Data Guard
- Automated Database Upgrades using Oracle Active Data Guard and DBMS_ROLLING

My Oracle Support Notes

- Note 2466177.1 - ODA: ODABR a System Backup/Restore Utility
- Note 1265700.1 - Oracle Patch Assurance - Data Guard Standby-First Patch Apply
- Note 1617946.1 - Creating a Physical Standby Database using RMAN Duplicate (RAC or Non-RAC)
- Note 2283978.1 - Creating a Physical Standby database using RMAN restore from service
- Note 785347.1 - Mixed Oracle Version support with Data Guard Redo Transport Services
- Note 2217053.1 - RAC Rolling Install Process for the "Oracle JavaVM Component Database PSU/RU" (OJVM PSU/RU) Patches

Index