

Technical white paper



Standardize Oracle Data Guard Provisioning Using HP DMA

HP Database and Middleware Automation version 10.22

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Purpose

This paper describes how to use HP Database and Middleware Automation (HP DMA) to create a repeatable, standardized “gold image” for provisioning Oracle Data Guard.

Tip: Before you can provision Oracle Data Guard, refer to the following papers for instructions to provision the prerequisite Oracle environment:

- For a clustered environment, see *Standardize Oracle RAC Provisioning Using HP DMA*
- For a Grid standalone environment, see *Standardize Oracle Grid Standalone Provisioning Using HP DMA*

These documents are available at: softwaresupport.hp.com

Benefits of HP DMA

HP DMA automates many of the daily administrative tasks required to manage the lifecycle of relational databases and J2EE application servers. These tasks are complex, often manual, typically time-consuming, and frequently error-prone. HP DMA improves the efficiency of these administrative tasks, enabling administrators to deliver change faster with higher quality, better consistency, and improved reliability.

HP DMA equips you to do the following:

- Define and enforce standards for software installation
- Define an installation process once and reuse it repeatedly
- Leverage knowledge enterprise-wide
- Avoid human error

What Oracle Data Guard does

The Oracle Data Guard provides disaster recovery replication to a physical standby database, providing you a contingency plan if your entire environment goes down. It has these features:

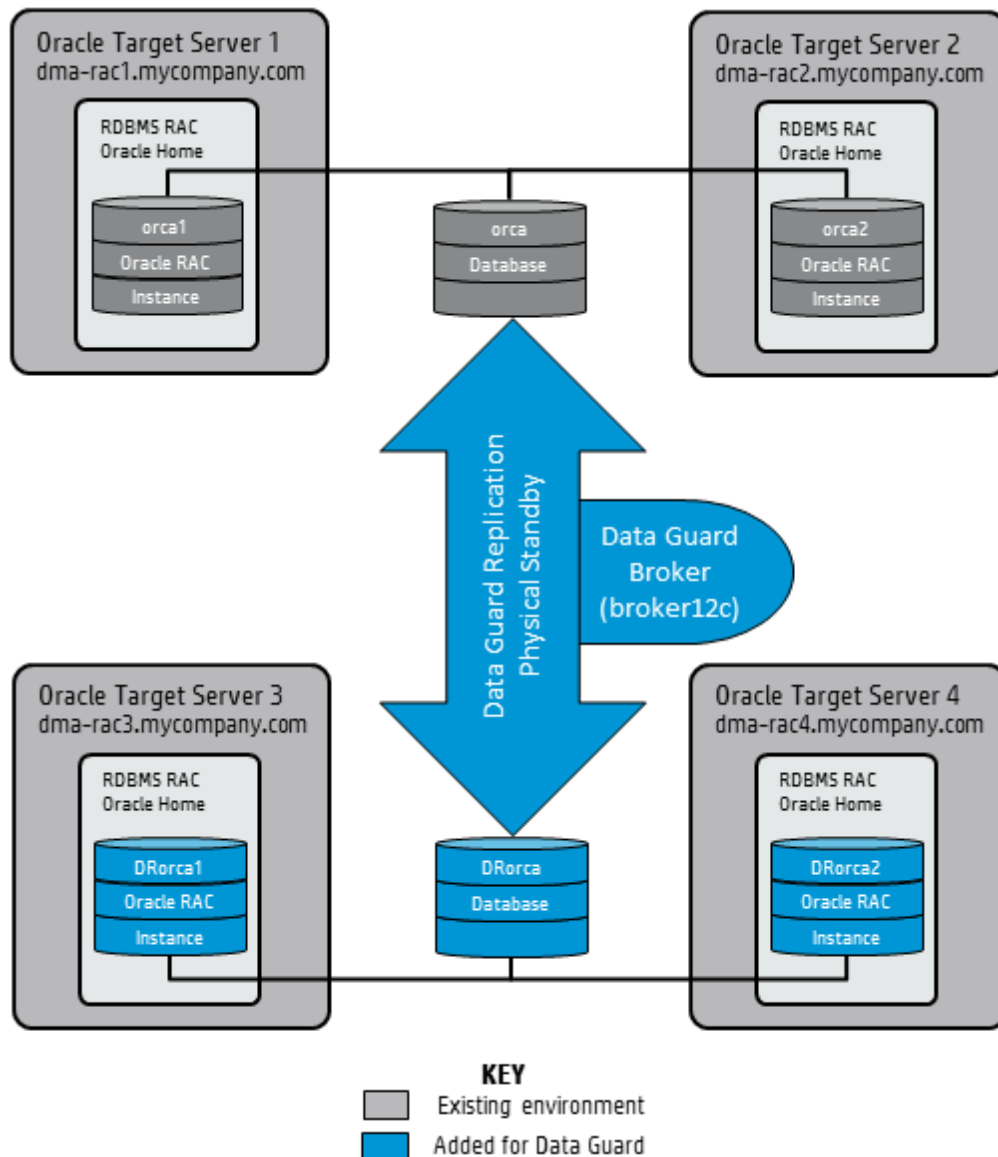
- Ensures high availability, data protection, and disaster recovery for enterprise data
- Creates, maintains, manages, and monitors one or more standby databases to enable production Oracle databases to survive disasters and data corruptions
- The standby databases are transactionally consistent copies of the production databases
- If the production database becomes unavailable because of a planned or an unplanned outage, Data Guard can switch any standby database to the production role, minimizing the downtime associated with the outage
- Facilitates failovers and switchovers to alternative hosts in the same or alternative locations
- Can be used with traditional backup, restoration, and cluster techniques to provide a high level of data protection and data availability

- Allows administrators to offload resource-intensive backup and reporting operations to standby systems
- The primary database can be either a single-instance Oracle database or an Oracle Real Application Clusters (RAC) database

Goal

This paper describes how to create the following Data Guard configuration. This example shows a previously existing Oracle RAC environment that has a physical standby database created and set up, and the data guard broker configured.

Note: You can use the same instructions to create a Data Guard configuration on an existing Oracle Grid standalone environment. The diagram would be simpler and the parameter example values would change appropriately.



Note: RAC complements Data Guard to help keep critical systems running with greater levels of availability and data protection.

RAC enables multiple independent servers that are linked by an interconnect to share access to an Oracle database, providing high availability, scalability, and redundancy during failures.

RAC and Data Guard together provide the benefits of both system-level, site-level, and data-level protection, resulting in high levels of availability and disaster recovery without loss of data.

HP DMA Versions

In the course of HP DMA development, improvements to workflows and steps could cause customers' existing deployments and customizations to break (for example, by changing steps, parameters, or mappings). In this case, HP DMA releases the upgrade with a version appended to the name. For example: Workflow Name v2

You should always use the latest (highest version number) of the HP DMA workflows and steps.

Prerequisites

Before performing the procedures in this paper, your environment must meet the following minimum requirements:

- HP DMA version 10.22 (or later) with the HP DMA Advanced Database Provisioning Solution Pack installed
- Servers running one of the following operating systems:
 - Linux (any version that is supported by Oracle and HP DMA)
 - AIX
 - Solaris

Note: For the configuration illustrated in [Goal](#), you need 2 servers for the primary cluster and 2 servers for the secondary cluster.

- Oracle 11.2.0.x or 12.1.0.x with the following Oracle configuration:
 - The Oracle Grid Infrastructure is installed on both the primary cluster servers and the standby cluster servers.
 - The Oracle database software is installed on all cluster servers.
 - Your primary database and your primary cluster already exist.

Tip: The following HP DMA workflows can help you achieve this configuration:

- HP DMA Oracle - Provision or Upgrade Grid Infrastructure
- HP DMA Oracle - Provision Database Software
- HP DMA Oracle - Provision Database

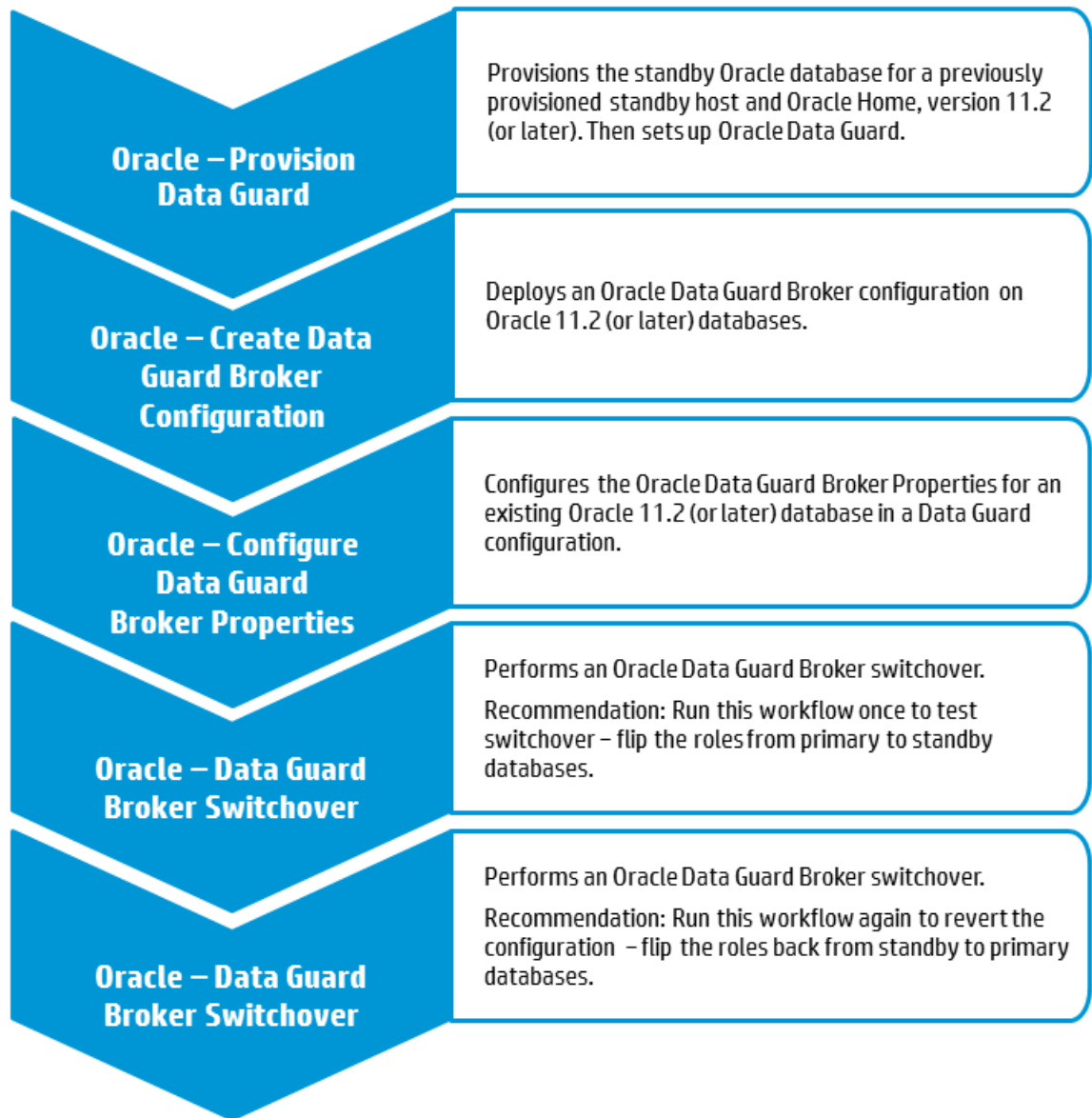
- The primary node of the primary cluster is able to `ssh` as root to ALL nodes in the standby cluster.
- Licenses for Oracle Database and HP DMA.

Tip: For detailed instructions to provision the required Oracle clustered environment using HP DMA, see *Standardize Oracle RAC Provisioning Using HP DMA*, available at: softwaresupport.hp.com

Tip: If you are configuring data guard in an Oracle Grid standalone environment, the prerequisites are appropriately simplified. For detailed instructions to provision this environment, see *Standardize Oracle Grid Standalone Provisioning Using HP DMA*, available at: softwaresupport.hp.com

Process Overview

Use the following HP DMA workflows to standardize the process of provisioning, configuring, and verifying Oracle Data Guard:



Tip: You can verify that Data Guard Broker switchover works by first flipping the roles from the primary to the standby databases (workflow 4 in the diagram). After you are confident that is successful, revert back to the primary databases (workflow 5 in the diagram).

The following sections provide detailed information required to run each workflow.

Note: For additional information, see [How to run an HP DMA workflow](#).

Workflow 1: Oracle - Provision Data Guard

This section provides detailed information required to run the Oracle - Provision Data Guard workflow.

Note: Make sure to use the latest (highest version number) of this workflow. For more information see [HP DMA Versions](#).

Solution pack

This workflow requires the HP DMA Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

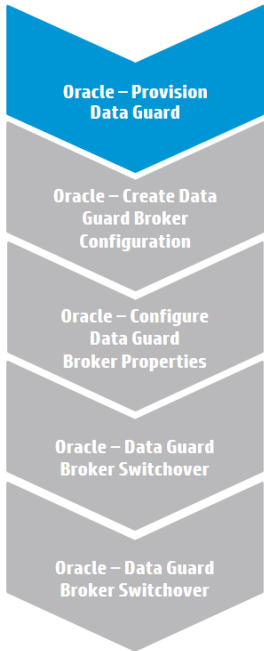
When you deploy the Oracle - Provision Data Guard workflow, specify input parameter values for the following steps.¹

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Provision Oracle Data Guard

Parameter	Description	Example Value
Database Protection Mode	<p>Required: Data Guard database protection mode. Valid values are:</p> <ul style="list-style-type: none"> - Maximum Performance Transactions commit after the redo data required to recover those transactions is written to the online redo log - Maximum Availability Transactions commit after the redo data is written to the online redo log and the standby redo log on at least one synchronized standby database - Maximum Protection Similar to Maximum Availability, except that the primary database shuts down if it cannot write its redo stream to at least one synchronized standby database 	Maximum Availability
Oracle OS User	Required: Oracle OS username used to derive primary node database properties.	oracle

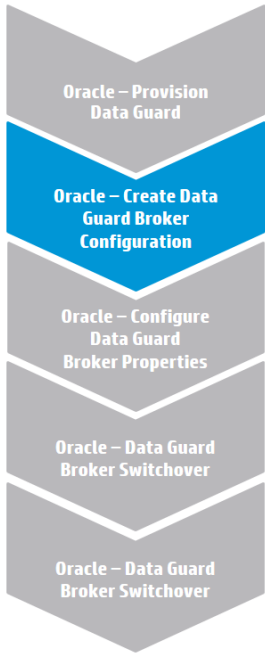
¹HP DMA uses the latest (highest version number) of steps. For more information see [HP DMA Versions](#).



Step: Gather Parameters for Provision Oracle Data Guard, continued

Parameter	Description	Example Value
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com
Standby DB Prefix Name	Required: Prefix that is appended to the DB_NAME to become the DB_UNIQUE_NAME for the standby databases.	DR
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com

Workflow 2: Oracle - Create Data Guard Broker Configuration



This section provides detailed information required to run the Oracle - Create Data Guard Broker Configuration workflow.

Solution pack

This workflow requires the HP DMA Advanced Database Provisioning Solution Pack.

Parameters to expose

None

Input parameters

When you deploy the Oracle - Create Data Guard Broker Configuration workflow, specify input parameter values for the following steps.

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Create Data Guard Broker Configuration

Parameter	Description	Example Value
Data Guard Broker Config Name	Required: The name that will be assigned to the Broker configuration that you are creating.	broker12c
Data Guard Standby Type	Required: The type of standby databases that you are configuring. Valid values are Physical, Logical, or Snapshot (only Physical is currently implemented).	Physical
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com <i>Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard deployment.</i>
Standby Connect Identifier	Required: Comma-separated list of the connect strings used to connect to the standby databases. These are defined in the <code>tnsnames.ora</code> file. Make sure that the <code>tnsnames.ora</code> file on every database and instance that is part of the configuration contains an entry for these connect identifiers.	DRorca <i>Use the value of the Standby DB Prefix Name parameter for the Oracle - Provision Data Guard deployment <u>plus</u> the target's primary database name.</i>

Step: Gather Parameters for Create Data Guard Broker Configuration, continued

Parameter	Description	Example Value
<p>Standby Node Hostnames</p>	<p>Required: Comma-separated list of up to 30 standby database server host names or IP addresses.</p> <p>If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.</p>	<p>dma-rac3.mycompany.com, dma-rac4.mycompany.com</p> <p><i>Use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard deployment.</i></p>

Workflow 3: Oracle - Configure Data Guard Broker Properties

This section provides detailed information required to run the Oracle - Configure Data Guard Broker Properties workflow.

Solution pack

This workflow requires the HP DMA Advanced Database Provisioning Solution Pack.

Parameters to expose

None

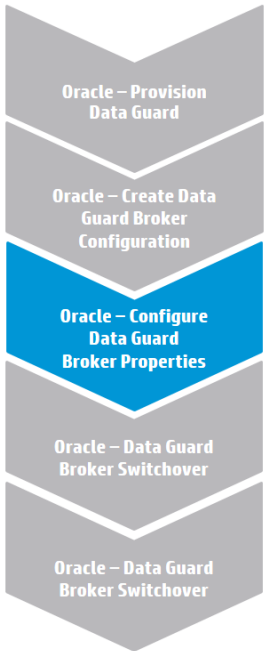
Input parameters

When you deploy the Oracle - Configure Data Guard Broker Properties workflow, specify input parameter values for the following steps.

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Configure Data Guard Broker Properties

Parameter	Description	Example Value
Archive Lag Target	Optional: Specifies the maximum time (in seconds) by which the standby database can lag behind the primary database. Valid values are 0 (zero) or 60-7200 seconds. If you specify Archive Lag Target, you must also specify Standby DB Unique Name.	600
Broker Config State	Optional: Enables or disables Broker management of the primary and all standby databases in the specified Broker configuration. Valid values are ENABLE or DISABLE.	ENABLE
Disable Standby DB	Optional: Comma-separated list of up to 30 standby databases for which Broker management will be disabled. For Oracle - Configure Data Guard Broker Properties - not yet implemented.	



Step: Gather Parameters for Configure Data Guard Broker Properties, continued

Parameter	Description	Example Value
LogXptMode	<p>Optional: Sets the redo transport service on the specified standby databases. Valid Values are SYNC or ASYNC.</p> <ul style="list-style-type: none"> - SYNC ensures the highest level of data protection for the primary database, but it also incurs the highest performance impact. You must use SYNC for maximum protection and maximum availability modes. - ASYNC offers a moderate grade of data protection for the primary database and incurs a lower performance impact than SYNC. 	SYNC
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	<p>Required: Comma-separated list of primary database server host names or IP addresses.</p> <p>If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.</p>	<p>dma-rac1.mycompany.com, dma-rac2.mycompany.com</p> <p><i>Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard and Oracle - Create Data Guard Broker Configuration deployments.</i></p>
RedoTransmit	Optional: Start or stop the redo transport services from the primary database to all standby databases. Valid values TRANSPORT-ON or TRANSPORT-OFF.	TRANSPORT-ON
Standby DB State	Optional: Start or stop the Redo Apply services on the specified physical standby database. Valid values are APPLY-ON or APPLY-OFF. If you specify the Standby DB State, you must also specify the Standby DB Unique Name.	APPLY-ON
Standby DB Unique Name	Optional: Unique name of the standby database whose property is being changed (see Standby DB State, Archive Lag Target).	

Step: Gather Parameters for Configure Data Guard Broker Properties, continued

Parameter	Description	Example Value
Standby Node Hostnames	<p>Required: Comma-separated list of up to 30 standby database server host names or IP addresses.</p> <p>If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.</p>	<p>dma-rac3.mycompany.com, dma-rac4.mycompany.com</p> <p><i>Use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard and Oracle - Create Data Guard Broker Configuration deployments.</i></p>

Workflow 4: Oracle - Data Guard Broker Switchover #1

This section provides detailed information required to run the Oracle - Data Guard Broker Switchover workflow.

Note: This paper instructs you to run this workflow two times. This first time describes how to test switchover by switching the databases from primary to standby.

Solution pack

This workflow requires the HP DMA Advanced Database Provisioning Solution Pack.

Parameters to expose

None

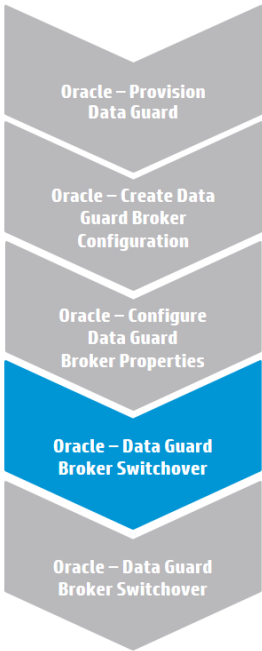
Input parameters

When you deploy the Oracle - Data Guard Broker Switchover workflow, specify input parameter values for the following steps.

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Data Guard Broker Switchover

Parameter	Description	Example Value
Oracle Account	Required: The user who owns ORACLE_HOME.	oracle
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac1.mycompany.com, dma-rac2.mycompany.com <i>Use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.</i>
Standby Node Hostnames	Required: Comma-separated list of up to 30 standby database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com <i>Use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.</i>



Step: Gather Parameters for Data Guard Broker Switchover, continued

Parameter	Description	Example Value
Switchover DB Unique Name	Required if the Switchover or Failover task is specified: Unique name of the standby database that will become the primary database in a switchover or failover operation.	DRorca <i>Use same value as the Standby Connect Identifier for the Oracle - Create Data Guard Broker Configuration deployment.</i>

Workflow 5: Oracle - Data Guard Broker Switchover #2

This section provides detailed information required to run the Oracle - Data Guard Broker Switchover workflow.

Note: This paper instructs you to run this workflow two times. This second time describes how to revert the switchover by switching the databases back from standby to primary.

Solution pack

This workflow requires the HP DMA Advanced Database Provisioning Solution Pack.

Parameters to expose

None

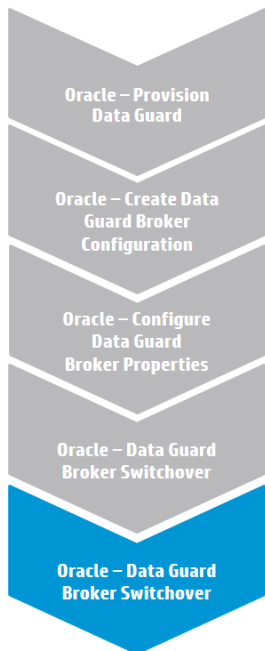
Input parameters

When you deploy the Oracle - Data Guard Broker Switchover workflow, specify input parameter values for the following steps.

Note: Bold text in the following table indicates that you must specify a value for the parameter.

Step: Gather Parameters for Data Guard Broker Switchover

Parameter	Description	Example Value
Oracle Account	Required: The user who owns ORACLE_HOME.	oracle
Oracle sys Password	Required: SYS Password for the primary and secondary databases.	●●●
Primary Node Hostnames	Required: Comma-separated list of primary database server host names or IP addresses. If more than one IP address/hostname is entered, it indicates that the primary database is on RAC.	dma-rac3.mycompany.com, dma-rac4.mycompany.com <i>To switch back to the standby database, use the same value(s) as the Standby Node Hostnames parameter for the Oracle - Provision Data Guard, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.</i>



Step: Gather Parameters for Data Guard Broker Switchover, continued

Parameter	Description	Example Value
Standby Node Hostnames	<p>Required: Comma-separated list of up to 30 standby database server host names or IP addresses.</p> <p>If more than one IP address/hostname is entered, it indicates that the standby database is on RAC.</p>	<p>dma-rac1.mycompany.com, dma-rac2.mycompany.com</p> <p><i>To switch back to the primary database, use the same value(s) as the Primary Node Hostnames parameter for the Oracle - Provision Data Guard, Oracle - Create Data Guard Broker Configuration, and Oracle - Configure Data Guard Broker Properties deployments.</i></p>
Switchover DB Unique Name	<p>Required if the Switchover or Failover task is specified: Unique name of the standby database that will become the primary database in a switchover or failover operation.</p>	<p>orca</p> <p><i>Use the primary target's database name.</i></p>

Appendix A: How to run an HP DMA workflow


The following steps outline the general instructions to run an HP DMA workflow:

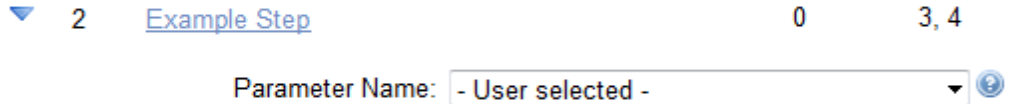
1. Import the specified HP DMA solution pack (if it is not already available).
2. Create a deployable copy of the workflow: Specify a name, add roles, optionally expose parameters (for additional information, see [How to expose hidden parameters](#)), and then **Save**.
3. Create a deployment: Specify a name, schedule, targets, and input parameters, and then **Save**.
4. Execute the deployment to run the workflow.
5. View the results to verify that the workflow ran correctly (refer to the online workflow documentation).

Note: For more information about running HP DMA workflows, see the *HP DMA Quick Start Tutorial* available at: softwaresupport.hp.com

Appendix B: How to expose hidden parameters

If you need to expose any hidden parameters, perform the following additional steps when you create a deployable copy of the workflow:

1. Click the Workflow tab.
2. Click the blue arrow  next to the pertinent step to expand the list of input parameters.
3. For the parameter that you want to expose, select **- User selected -** from the drop-down list. For example:



4. Repeat steps 2 and 3 for all the parameters that you would like to expose.
5. Save the copy of the workflow.

To learn more about HP Database and Middleware Automation visit
hp.com/go/dma

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